SCIENTIFIC AMERICAN

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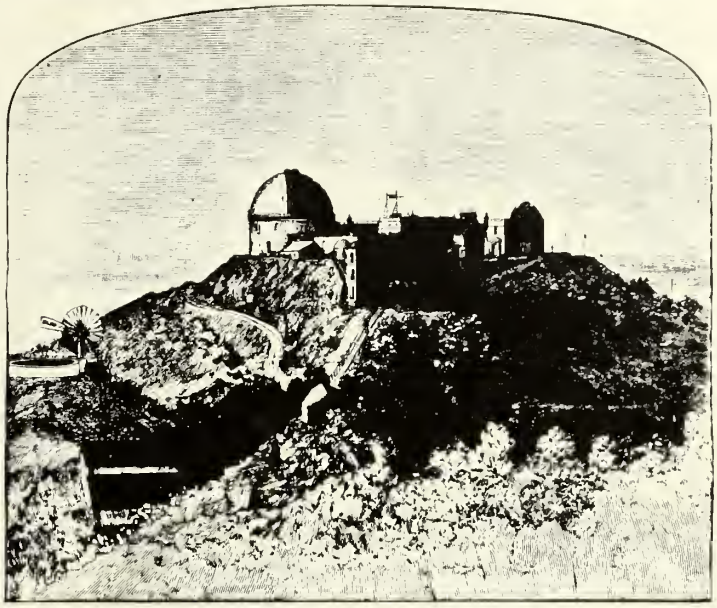
James Lick, whose name has already acquired a world-wide fame as the establisher of the Lick Observatory, was born in 1798, in Pennsylvania. He led a somewhat adventurous life, and before he was thirty years old had accumulated a few thousand dollars. This he had made principally in South America, where he spent some years. In 1827 he went to California and visited the old mission town of San Francisco. The splendid harbor, the only one on many miles of coast, greatly impressed Mr. Lick, and he began purchasing land. Twenty-one years later, when gold had been discovered, and when the rush to California began, his investments acquired new value, and he ultimately became immensely rich. He was a man of very secluded habits, was a skillful mechanic, and, it is said, was especially fond of astronomy. Toward the end of his life he lived near San Jose, in the Santa Clara Valley. In 1874 he made over by deed to a body of trustees the sum of two millions of dollars for various public and philanthropic uses, and in 1875 made a revised deed to the same general effect. Besides various charitable donations, it included the following gifts: $150,000 for free public baths in San Francisco; $100,000 for statuary for the new City Hall of that city; $90,000 for a monument to Francis Scott Key, the author of "The Star Spangled Banner;" $540,000 to endow the California School of Mechanic Science in San Francisco; and $700,000 for procuring for the University of California "a telescope of greater power than any yet made." The total value of the trust fund was estimated at $5,000,000.

As the site for his observatory he selected Mount Hamilton, near his home in the Santa Clara Valley. He died October 1, 1876, aged 78 years. His body is interred under the base of the great telescope, (*Continued on page* 162.)



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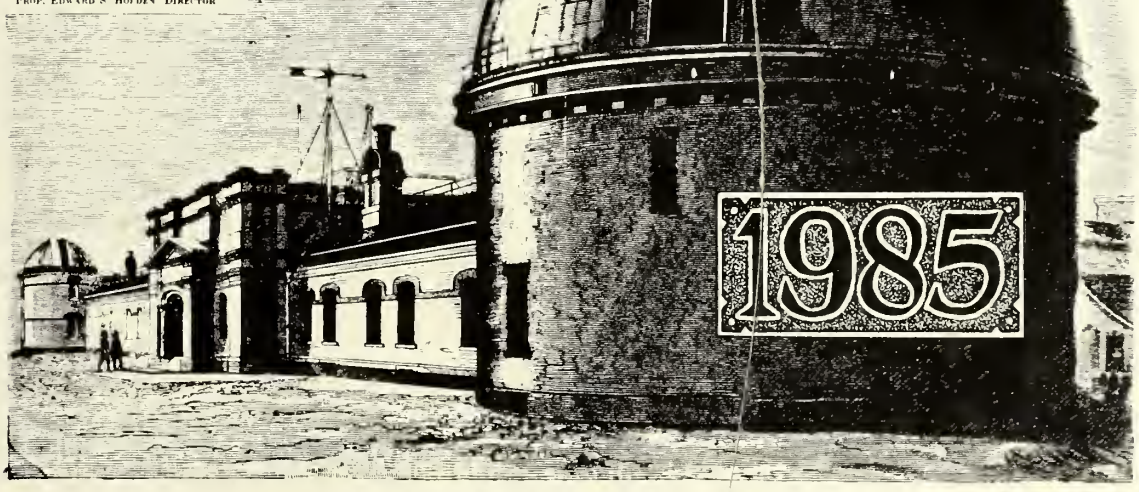


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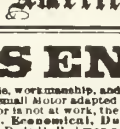

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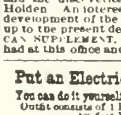

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The art of welding iron and steel by means of the heat of an ordinary fire is many centuries old, and it is perhaps one of those simple operations which would hardly be considered a subject for improvement, but the invention of Professor Thomson not only facilitates the welding of iron, steel, and such metals as have heretofore been welded by the old time methods, but permits of the welding of cast iron, copper, brass, German silver, zinc, aluminum, and other metals which have generally been considered poor subjects for the welding process. Besides these, this new process has been successfully applied to the welding of unlike metals, iron and German silver, iron and brass, being examples.

Fig. 2.—PLAN VIEW OF THE TRANSFORMER AND WELDING CLAMPS.

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(Continued on page 345.)

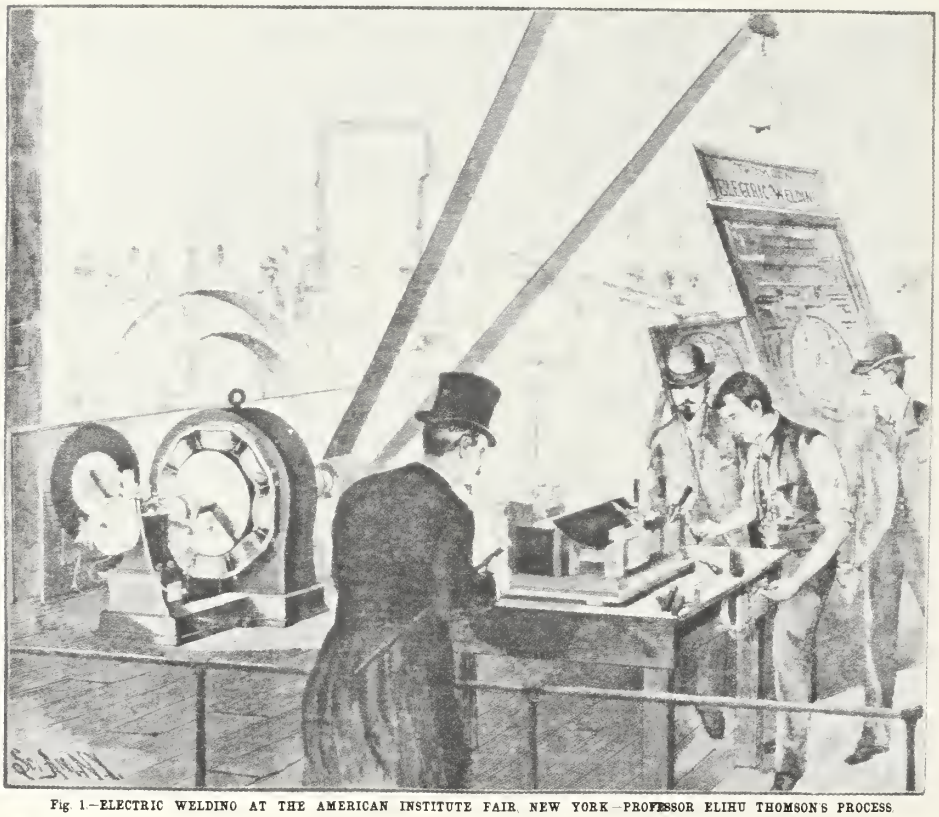
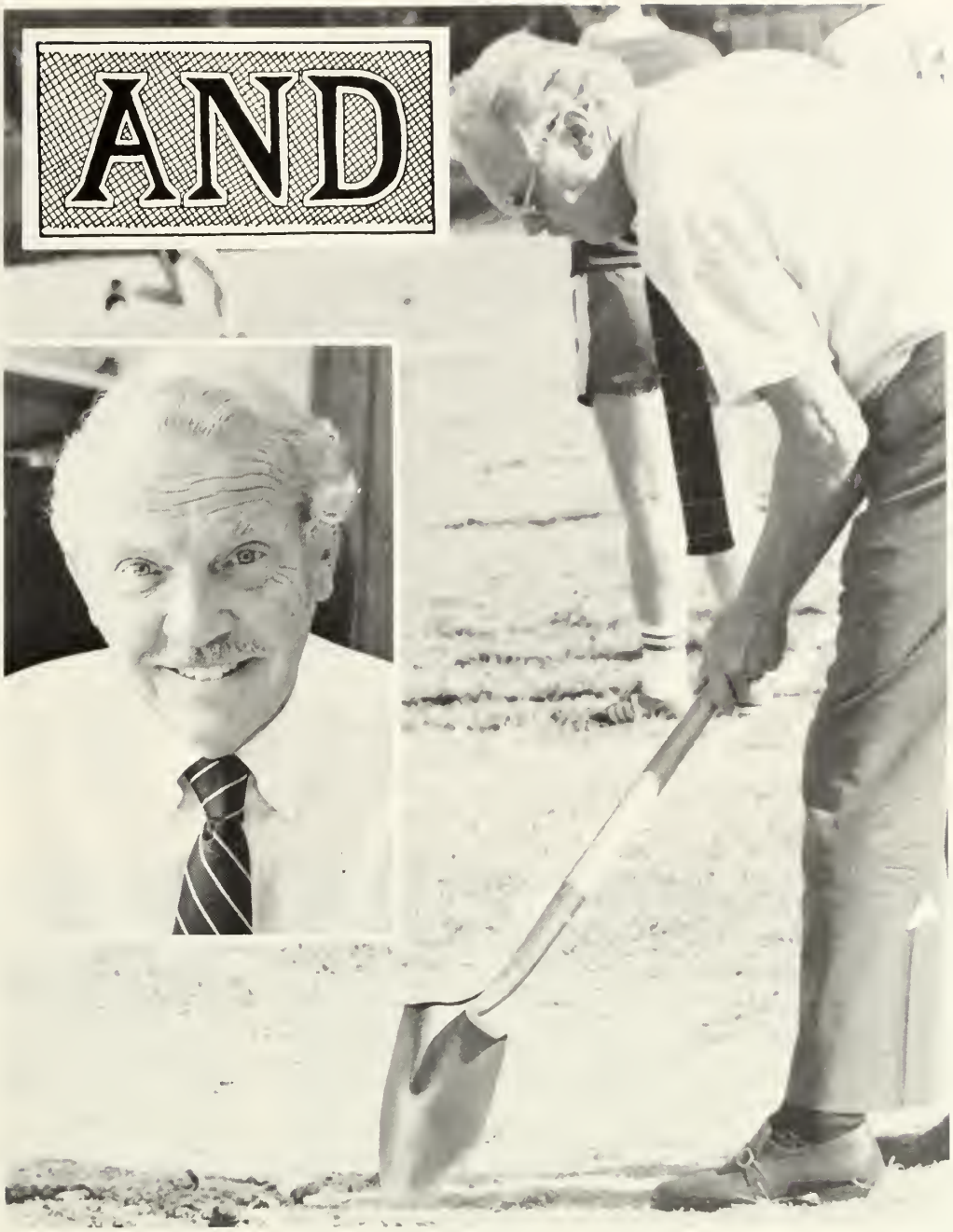



Fig. 1.—ELECTRIC WELDING AT THE AMERICAN INSTITUTE FAIR, NEW YORK—PROFESSOR ELIHU THOMSON'S PROCESS.

FACULTY

# AND

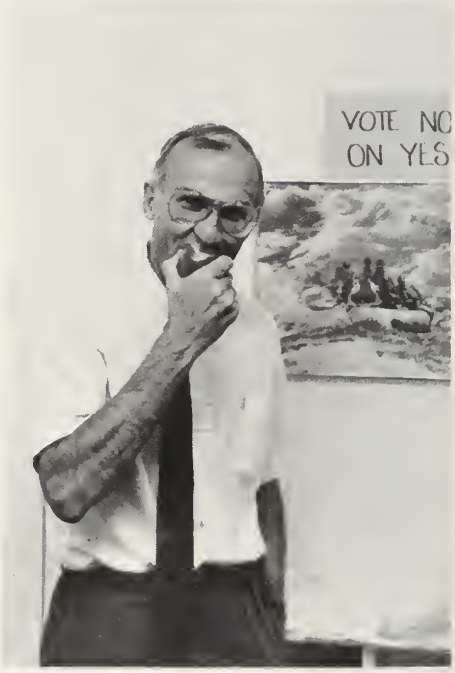


CHARLES S. DOWNES, HEADMASTER

# STAFF

ROLF PENN
DEAN OF STUDENTS

THEODORA VULJAN
REGISTRAR OFFICE MANAGER




DAVID DENMAN
DIRECTOR OF ADMISSIONS AND
COLLEGE COUNSELING

CHARLES PACHECO
DIRECTOR OF DEVELOPMENT AND ALUMNI AFFAIRS

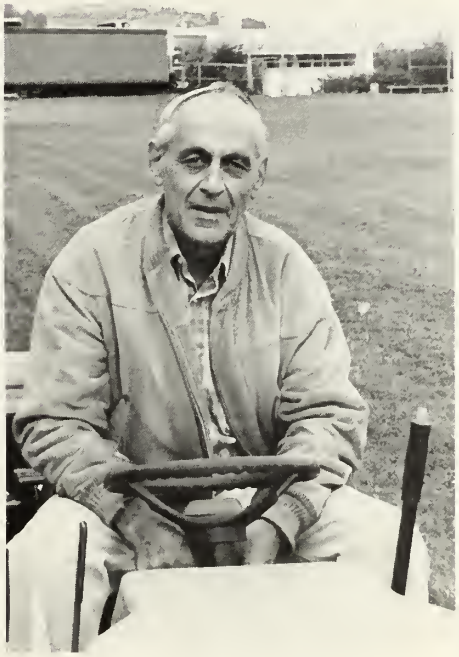
VICKY BERRY
BUSINESS MANAGER

GREGORY NELSON
SOCIAL SCIENCES

BLAKE RESPINI
SOCIAL SCIENCES

MARINO SICHI
WOOD SHOP

CHRISTINE SMITH
SOCIAL SCIENCES



GEORGE SIEBEL
MAINTENANCE SUPERVISOR

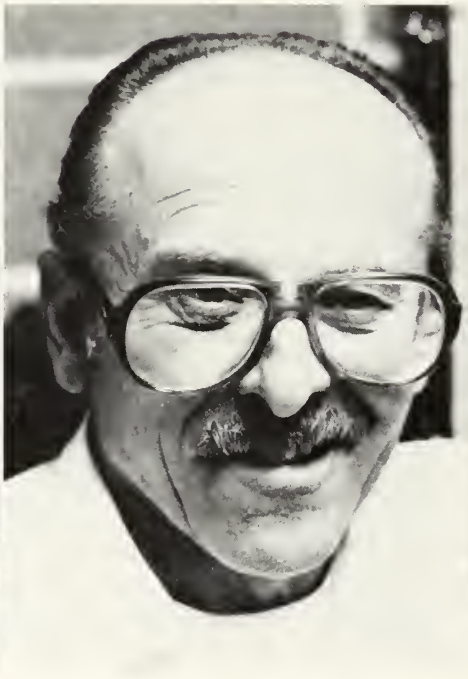
UTE VON DOYEN
GERMAN

PHILIPPE ARBEIT
FRENCH

PHILIP COATES
HISTORY
LIBRARIAN

RALPH FORSYTH
ELECTRICAL SHOP

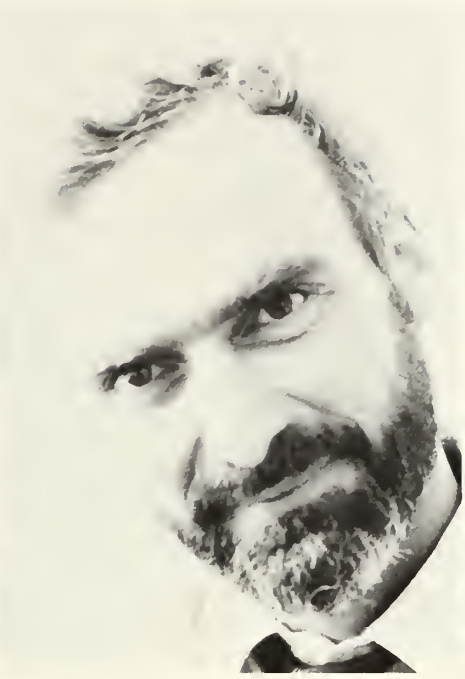
MARJORIE DONALDS
FRENCH



WILLIAM CHUCHWAR
MACHINE SHOP
JEWELRY

ELIZABETH CORNELL
ENGLISH

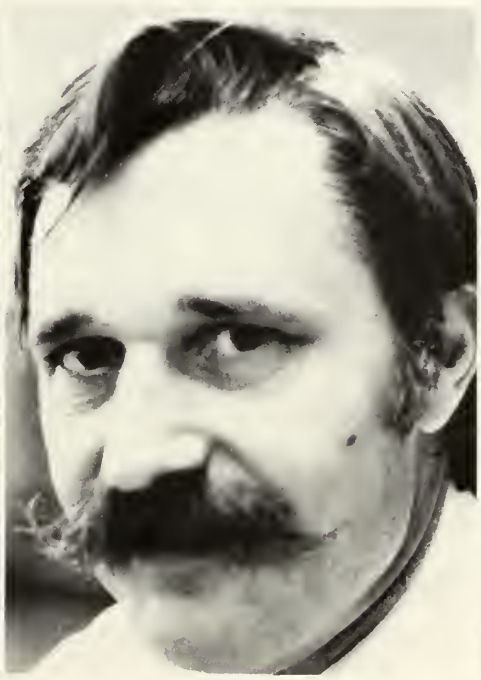
KATHERINE JARRETT
MATHEMATICS



STUART HAYNES
MATHEMATICS

KAY FRANCHESCI
PHYSICAL EDUCATION

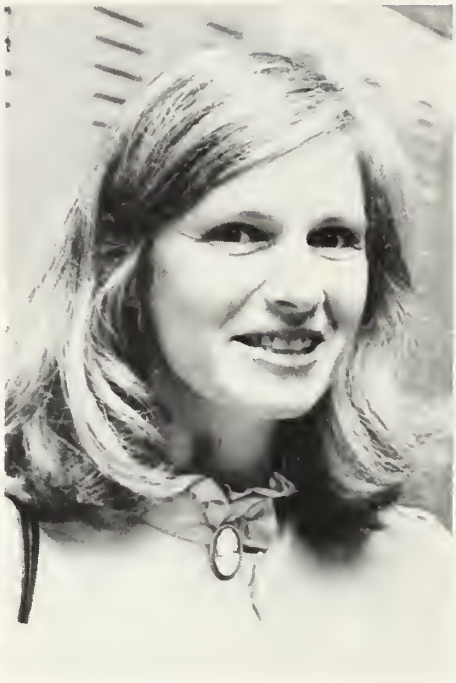
MARY ANDERSON
METAL SCULPTURE



JOHN ELLIS
CHEMISTRY

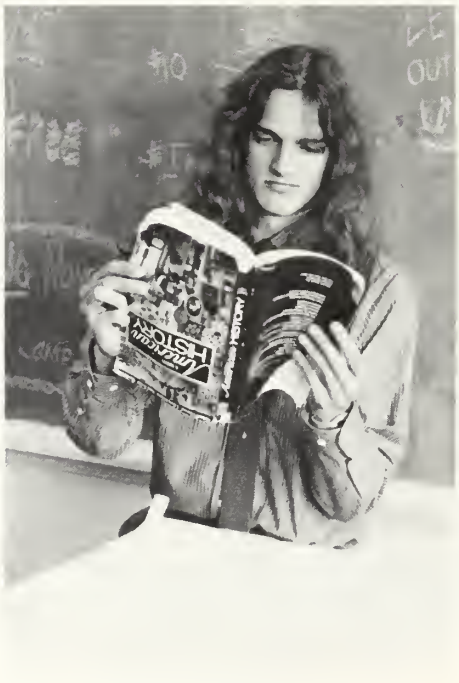
LAURA GIBBONS
MUSIC
COUNSELING

ELEANOR BURKE
ENGLISH



MARSHA JACOBSON
ENGLISH

BEVERLY BOITANO
MATHEMATICS



STEVE NICHOLSON
COMPUTER LAB

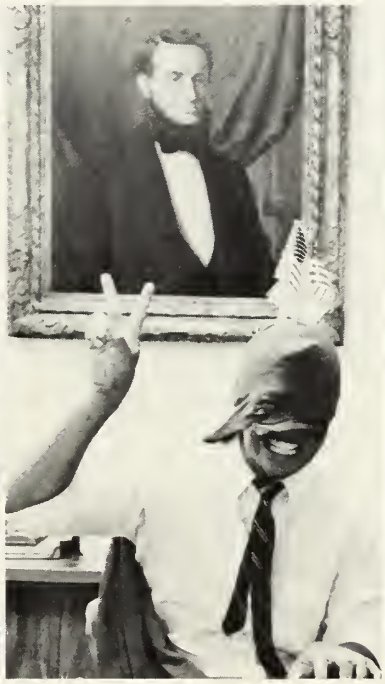
DEANNA TAGLE
DEVELOPMENT ASSISTANT

VICTOR HENRIQUEZ
CUSTODIAN

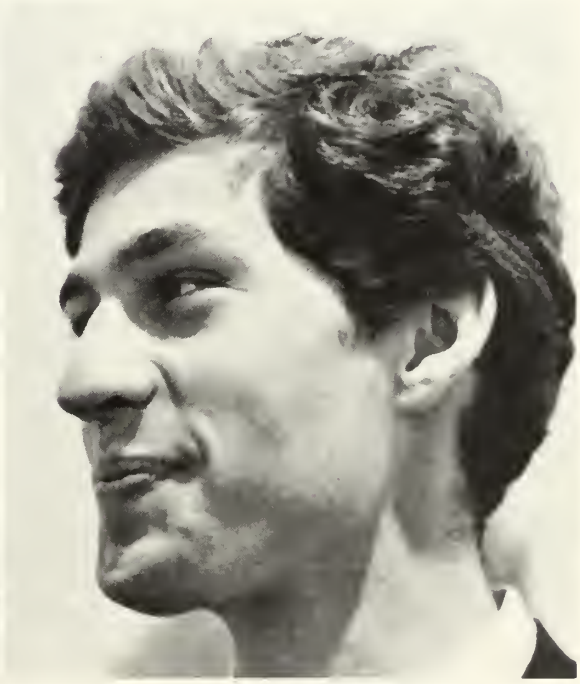
RAYMOND MARCHESE
PHYSICS, EARTH SCIENCE, MATH

ANN MAISEL
ENGLISH

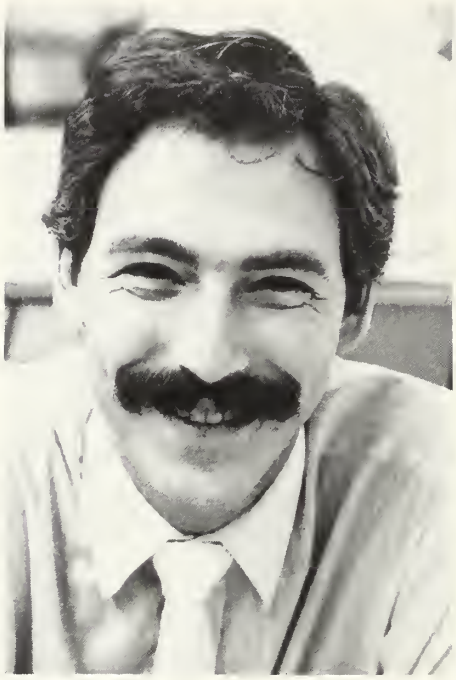
NORMA TORCHIA
CLERICAL



GAVIN FELICIANO
RECEPTIONIST
ADMISSIONS



JOEL WEISS
COMPUTER



STEVE SIMON
MATHEMATICS

KAYOKO YAMADA
CLERICAL

DON TAYLOR
PHYSICAL EDUCATION

ANGELE PASTORE
FRENCH

GEORGE TYROGALAS
DRAFTING/ARCHITECTURE

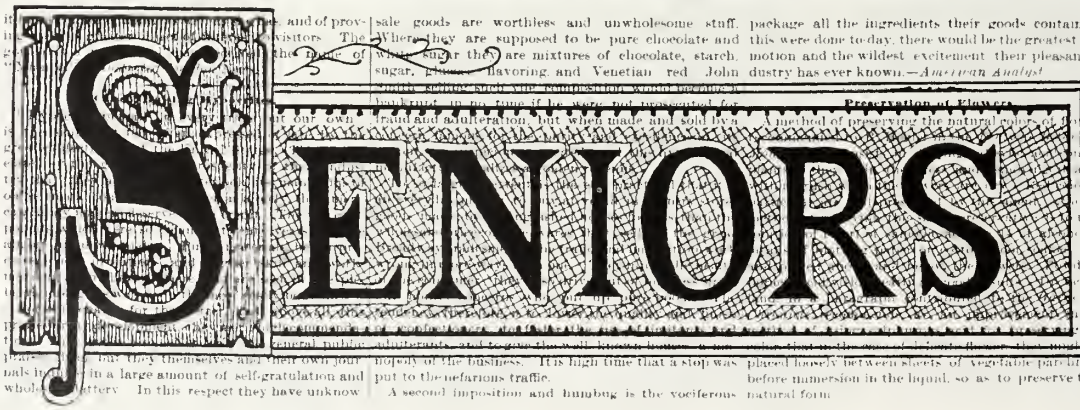
NANCY STEELE
ENGLISH

CLOCK-WISE: ELEANOR McBRIDE, BIOLOGY, GEORGIANA OSIPOVA, SPANISH, OLEG ISIPOFF, ART, MAUREEN POPPERS, COUNSELOR, TODD SAMET, BIOLOGY, JESUS ALVAREZ, CUSTODIAN.

### A LIVE GORILLA IN LONDON.

For the first time since the establishment of the gardens of the Zoological Society, a living gorilla has been added to the collection. It is a young animal, but as little is known of the life history of these creatures, so rarely seen in captivity, and as it brought no certificate of birth with it from its native land, it is impossible to give more than a guess at its exact age. Although it has been scarcely a month in the gardens, it is rapidly recovering from the shyness before strangers which it exhibited at first, and it feeds freely on almost every kind of fruit offered to it, showing a marked preference, however, for pomegranates. It has unfortunately arrived at an unfavorable time of the year for an inhabitant of the forests of tropical Africa; but as it is placed in the same house and under the same care as the remarkably intelligent and well educated chimpanzee "Sally," which has now lived exactly four years in the gardens, it may be hoped that

THE GORILLA AT THE ZOOLOGICAL SOCIETY'S GARDENS, LONDON.




and of prov- visitors. The the Prince of

but they themselves and their own jour- nals in in a large amount of self-gratulation and whole- attery. In this respect they have unknow-

ingly blown a very beautiful soap bubble, but still a soap bubble which is liable to be pricked by some one who knows. Their greatest danger lies in the hypocrisy of a number of their great dealers. Two in question are popular chocolate manufacturers. They can and do produce some of the finest and purest goods in the market. These are retailed in palatial shops at very high figures, and are naturally held up to popular admiration and esteem. The physician and chemist analyze them and pronounce them pure and superior in every regard, and the recommendation is published in every paper and read by every person in the land. Upon this popularity they do a wholesale business alongside of which their retail trade is the veriest bagatelle. But—and here lies the joke—the wholesale goods are not the same as those which are retailed, are not those which have been analyzed and commended, and are not what the public fancies it buys when it purchases. On the contrary, these wholesale goods are worthless and unwholesome stuff. Where they are supposed to be pure chocolate and sugar they are mixtures of chocolate, starch, sugar, [illegible] flavoring, and Venetian red. John Smith, seeing such vile composition, would prefer it [illegible] in no time if he were not prosecuted for fraud and adulteration, but when made and sold by a [illegible] eminent public [illegible] adulterants and to give the well known [illegible] honesty of the business. It is high time that a stop was put to the nefarious traffic.

A second imposition and humbug is the vociferous shout by the confectioners that they use no adulterants, but, on the contrary, punish the adulterator, and then the confidential whisper that adulterants are only those substances which in normal quantity injure human health. Under this exquisitely ingenious arrangement they replace sugar and fine gum with glucose, vanilla with tonka and vanilline, almonds with myrbane oil, butter with oleomargarine, rose with geranium, and fruit flavors with compound ethers. They "dilute" cocoanut with starch, sugar, and terra alba, and use homeopathic and therefore harmless quantities of dyes and colors that in ordinary amounts are injurious, if not destructive, to the stomach. Of course they do but little harm by most of these practices. Glucose, tonka, oleomargarine, compound ethers, and saccharated cocoanut are, if in good condition, beneficent rather than otherwise. But it is none the less imposition, humbug, and fraud. Let the confectioners adopt the English statute, and stamp on every package all the ingredients their goods contain. If this were done to-day, there would be the greatest commotion and the wildest excitement their pleasant industry has ever known.—*American Analyst.*

### Preservation of Flowers.

A method of preserving the natural colors of flowers, [illegible] placed loosely between sheets of vegetable parchment before immersion in the liquid, so as to preserve their natural form.

ON NE VOIT BIEN QU'AVEC LE COEUR

—ANTOINE DE SAINT-EXUPÉRY

JULIE MALORK

MARILYN SUSAN LUZZIO

KAREN GISHKIN

CHRISTOPHER BAKER

MARTIN A. PLACK

DAVID E. FALIK

RONALD REAGAN

Kilgor Trout once wrote a short story which was a dialogue between two pieces of yeast. They were discussing the possible purposes of life as they ate sugar and suffocated in their own excrement. Because of their limited intelligence, they never came close to guessing that they were making champagne.

-K. VONNEGUT

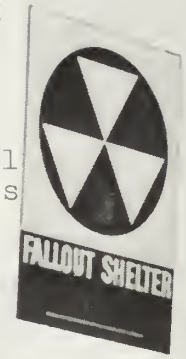
CHANGES...
TURN AND FACE THE STRANGE
CHANGES...
TIME MAY CHANGE ME, BUT I CAN'T
CHANGE TIME.
—DAVID BOWIE

Audrey Rosenthal

Jessica MacDermid

...Ultimately, this is what makes the nuclear age so dangerous. It has shifted the meaning of heroism. If we annihilate ourselves, it will not be because we were cowards. It will be because we were still trying to be yesterday's heroes.

-Mark Gerzon




MU JAH BAA
METAL JAR BABIES
MOLDED JAIL BARS
MINT JULEP BALLET
MISSISSIPPI JUG BAND
MASS JOB BONDAGE
MBLACK JACK BACK
MOROSE and JADED BEATNICKS
MULTIPLE JET BOMBINGS
M.J.B.M.J.B.M.J.B.!

*pinto the wonder horse is dead*

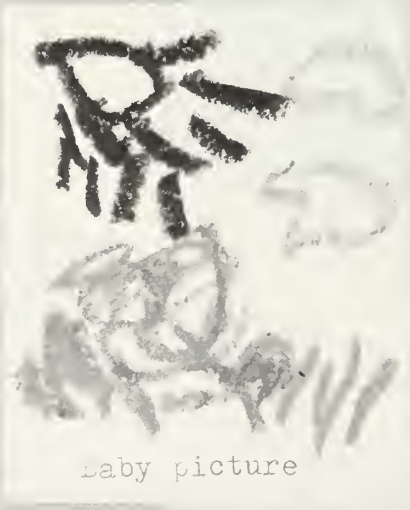
A BENEVOLENT GOD IN STARS AND STRIPES?
PINTO THE WONDER HORSE IS DEAD
UNITED NATIONS, ATOMS FOR PEACE
"never more" THEY SOLEMNLY SAID
NEUREMBURG WAS SO MUCH FUN
CRYING OUT FOR NAZI'S HEADS
WASHING OUR HANDS OF WHAT IT MEANT BUT
PINTO THE WONDER HORSE IS DEAD

URANIUM, OUR TRUSTY FREIND?
PINTO THE WONDER HORSE IS DEAD
MORE DEATH TO KEEP THE FREE WORLD SAFE
PACIFIC ISLANDS GO UP IN FLAMES
'GEE STALIN SURE IS A MEAN OLD MAN
TO THINK HE USED TO BE OUR FREIND
ENCROACHING REDS IN FITFUL DREAMS
PINTO THE WONDER HORSE IS DEAD

DEMOCRACY SPOON-FED ABROAD?
PINTO THE WONDER HORSE IS DEAD
THEIR POVERTY IS OUR GNP
AND M-16s WON'T GET THEM FED
THE SOBBING IN THE TORTURE CELL
IS OUR EMPIRE OF STEEL AND LEAD
FREE ENTERPRISE WILL GUN THEM DOWN
PINTO THE WONDER HORSE IS DEAD

TECHNOLOGY WORKING FOR MANKIND?
PINTO THE WONDER HORSE IS DEAD
FOR FORTY YEARS THEY'VE FOOLED THEMSELVES
BUT THE MONSTERS GROWN AND BODIES HAVE BLED
AND CHEEKS HAVE SAGGED AND CANCERS HIGH
PREMONITIONS SPELL THE END
YOU WONT SMOTHER US IN YOUR DREAMY LIE
PINTO THE WONDER HORSE IS DEAD

-MJB



Baby picture

DAVE KNOWLES

Don't let it hit you on the way out.
R.Marchese

WELCOME TO LICK-WILMERDING TRAILER PARK

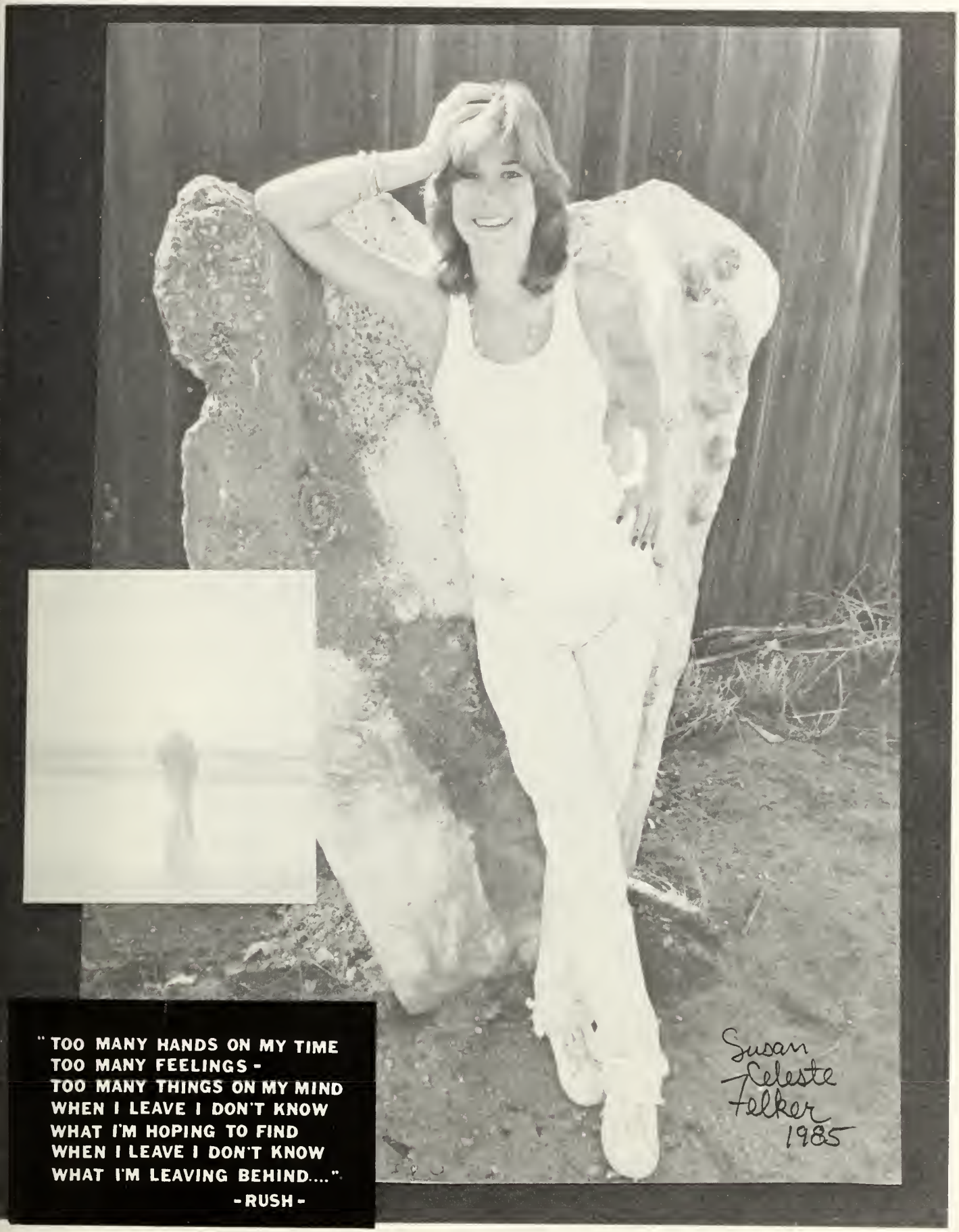
← - - - BEFORE CREW

Don Seward

AFTER CREW ↓

WHAT A BUNCH OF BULL!!!!!

CERRAH MENDELSOHN




"TOO MANY HANDS ON MY TIME
TOO MANY FEELINGS -
TOO MANY THINGS ON MY MIND
WHEN I LEAVE I DON'T KNOW
WHAT I'M HOPING TO FIND
WHEN I LEAVE I DON'T KNOW
WHAT I'M LEAVING BEHIND...."
-RUSH-

Look!
It's a mod
It's a big mod
What the Worl
needs is MORE
AVACADOE
Peter

Look!
It's a mod
It's a big mod
What the World
needs is MORE
AVACADOES

LIFE'S A BEACH

MAY U LIVE 2 SEE THE DAWN

"MOST OF US HAVE MORE THAN ONE CHOICE AND I CHOOSE TO BE WHAT I AM"- JAMES DEAN

ROMANY

TOM ALLEN

## ▼ from H block to springbok It must be love

The dream is always the same.....
Instead of going home, I go to the neighbors'.
I ring the bell, but no one answers.
The door's open, so I... go inside.
I'm looking for the people, but no one seems to be there.
And then I hear the shower running,
So I... go upstairs to see what's what.
And then I see her... this... girl, this incredible girl
And what she's doing there, I don't know, 'cause she doesn't live there.
It's a dream, so I go with it.
"Who's there," she says.
"Joel," I say.
"What are you doing here?"
"I don't know what I'm doing here. What are you doing here?"
"I'm taking a shower," she says.
And then I give her:
"You want me to go?"
"No. I want you to wash my back."
So now I'm getting enthusiastic about this dream.
So I go to her, but she's hard to find through all the steam and stuff.
Finally, I get to the door, and I... find myself in a room full of kids taking their college boards.
I'm over three hours late.
I've got two minutes to take the entire test.
I realize... I've just made a grave mistake.
I'll never get to college.
My life is ruined.....

LEONIE GARRIGUES

# KATIIE CLARK

"We can always live memories over again." R.S.-D.C.

C.S.h.- B.L.-never forget the great times...N.H.-'82 '84-B.F.,P.H.,M.W.,D.Y., D.C.,C.L.,J.H.,J.F...CSN. Wolfeboro, double-skiing. Paris '83,P.S...Santorini. Gille and Craig-Summer'84. K.P.-München,see you-'85. x-mas '83-J.D. "duck", earings...B.G.,E.N.,M.S., earpiercing."Soldiers taking orders because we must defend the borders of our nation..."Yaz. I'll miss you- M.J.B.,Jenny-Joe, EmBem,Droid,S-M-J,Beep's fries, & Al's...Sushi-Nippon, "700$ or B.B.Q."...D.K. inspired,R.W.,specialthanks-E.D.

"We hope for tomorrow when today is done."R.S.-D.C.

"these momments can save me a life time."D.K.

# Jenny Lempert

JULIET MANDANA JAMSHEED

"I WEAR A PAIR OF JEANS ONE DAY, AN ANTHONY PRICE SUIT THE NEXT-
...TOMORROW A STUDDED LOINCLOTH"

—SIMON LeBON

HAIGHT ST YEAH YEAH BRUTAL
NO DOUBT MY KNEES ARE WEAK!
CLEMENT ST SURFERS & CLEM-
ENT ST W/ JIM JOHN JULIE & SUE
WHAT A BO-RING NIGHT -
SPEAKING OF BO(BEAU)! ...
CAFE FLORE FAG HAGS, IAN
MEN WHO DRESS LIKE WOMEN
WHAT A WASTE OF HUMAN
FLESH - ABSOLUTELY, NO DOUBT
GRAFFITI→THANKS UALY FOR
SHAWN THE GREEKS THE I-
TALIANS IVAN ... DIVE-IN POOF-
TOP JOE COOL & THE ENTIRE
CAST AT FRANKS EXTRA
BAR NO BEACH SAVOY HANDY
MALOOD CHRIS YOUNG AMERI-
CANS LOLA 2SHY DB'S WHAT'S
GOING ON BABE? CIAO BABE.
JAMMING IN THE RABBIT I'M
MORE CONCERNED ABOUT AN
AVOCADOE SANDWICH THAN
THE ATMOSPHERE MEN WHO
LOOK LIKE RODENTS SHOULD
NOT WEAR TWEED ... BARBERS
SCARE ME (ESPECIALLY TWINS).
IT'S A BLOODY MESS... SURFER
TALK - I'M STOKED - MY THRUSTER...
WHAT HISNAME - YOU KNOW...
CAN YOU SEE? YES HIT. ME OKAY.
BOAT PARTIES & THE FIRST KISS
I DID IT! GET OUT FROM BEHIND
THAT TREE! BALD PETERS - CHAUVE
QUI PEUT! PINK HEARTS MY GOD
THAT'S BEAU I'M SO POOR I CAN'T
EVEN PAY ATTENTION... DOESN'T
HAVE TO BE A NICE DAY JUST
THE ONLY ONE YOU'VE GOT...

LYLA MAX

WE COULD BE HEROES

JUST FOR ONE DAY

SHEILA YATES

# Garo John Eldemir

Beauty is only skin deep, but ugly goes clear to the bone.

"I could 'a had class, I could 'a been a contender, I could 'a been somebody. Instead of a bum, which is what I am." M.B.

"All those moments will be lost in time, like tears in rain." – R.B.

JAMES WHITTEN

Rebecca

Lisa

**REBECCA & LISA !**

EMIKO SEKINO

IF MUSIC IS THE FOOD OF LIFE,
THEN SING ON, SING ON, SING ON.
-THOMAS D'URFREY

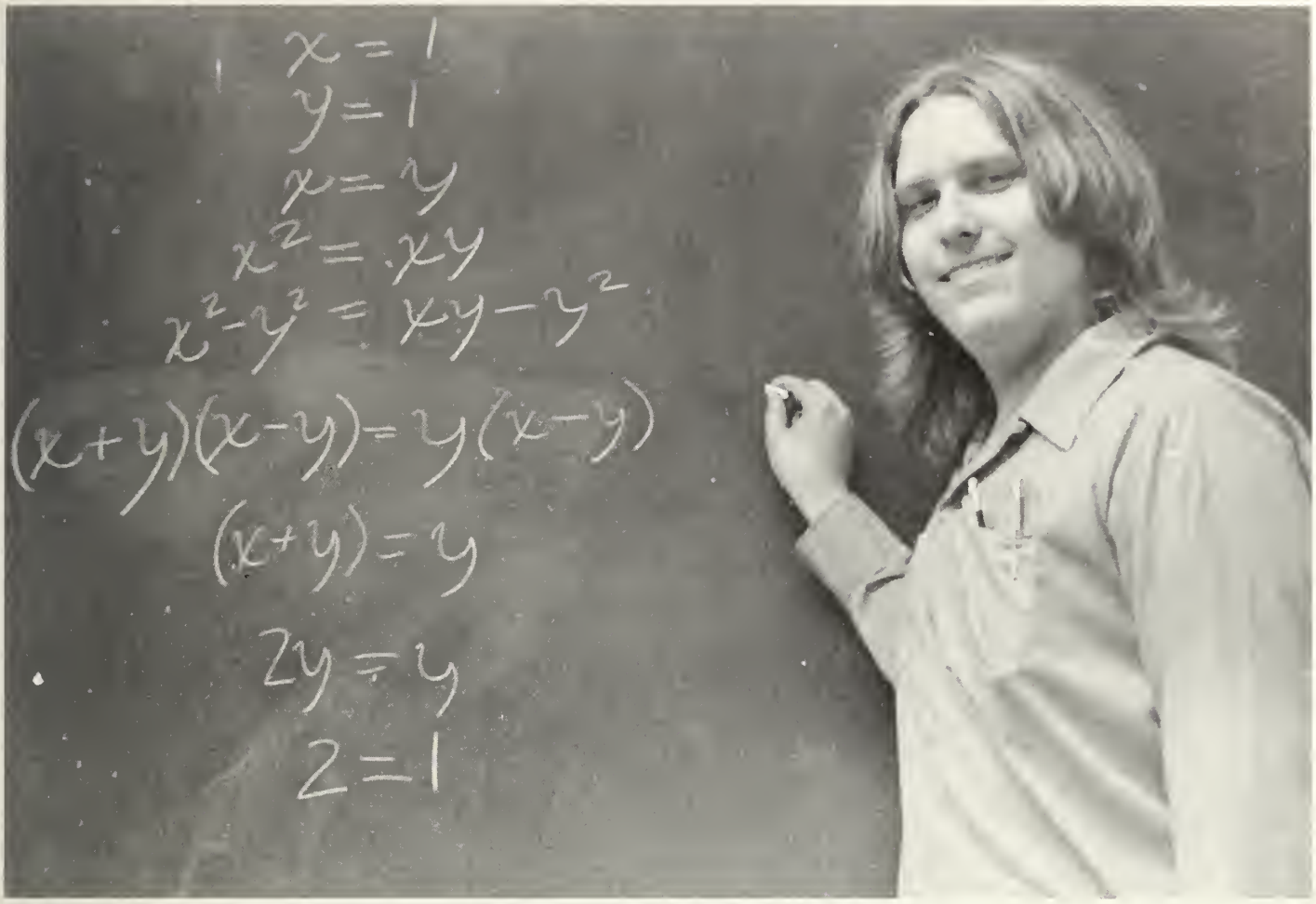
CLEAR MIDNIGHT

This is thy hour O soul,
 thy free flight into the wordless,
Away from books,away from art,
 the day erased,the lesson done,
Thee fully forth emerging,silent,
 gazing,pondering the themes thou
  lovest best,
Night,sleep,death,and the stars.

Walt whitman (1881)

Leslie Spicer

ethan
nosowsky




I SENT OFF A LETTER WITH A WORD TO THE WISE...
THEY SENT IT BACK WITH THE SPELLING CORRECTED.

-M.A.

SOMETIMES I WONDER ABOUT THE CREATOR OF THE UNIVERSE.

-K.V.

EVAN HUNT

ANGELIQUE MARIA NEUMANN-PEREA

KAREN ANN YORN

# KARL WILLIAM TEDE

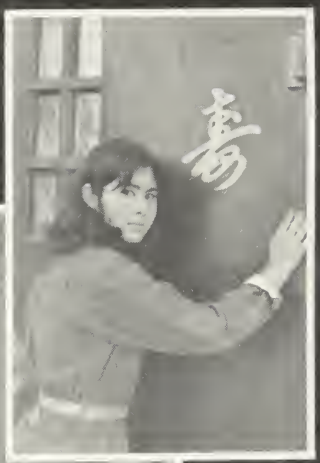
TO ERR IS HUMAN, BUT TO REALLY FOUL THINGS UP TAKES A COMPUTER.

MURPHY'S LAWS ON TECHNOLOGY

RODERICK WYLLIE

→→ "Now here, you see, it takes all
in the same place. If you want
you must run at least twice

the running you can do, to keep
to get somewhere else,
as fast as that." ∴
Lewis Carroll



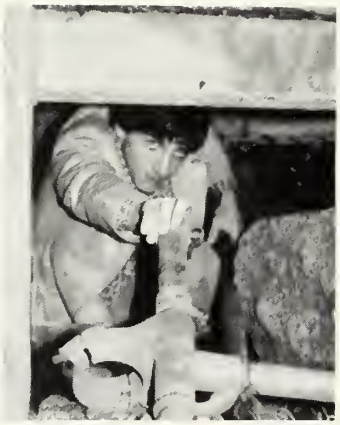
道子

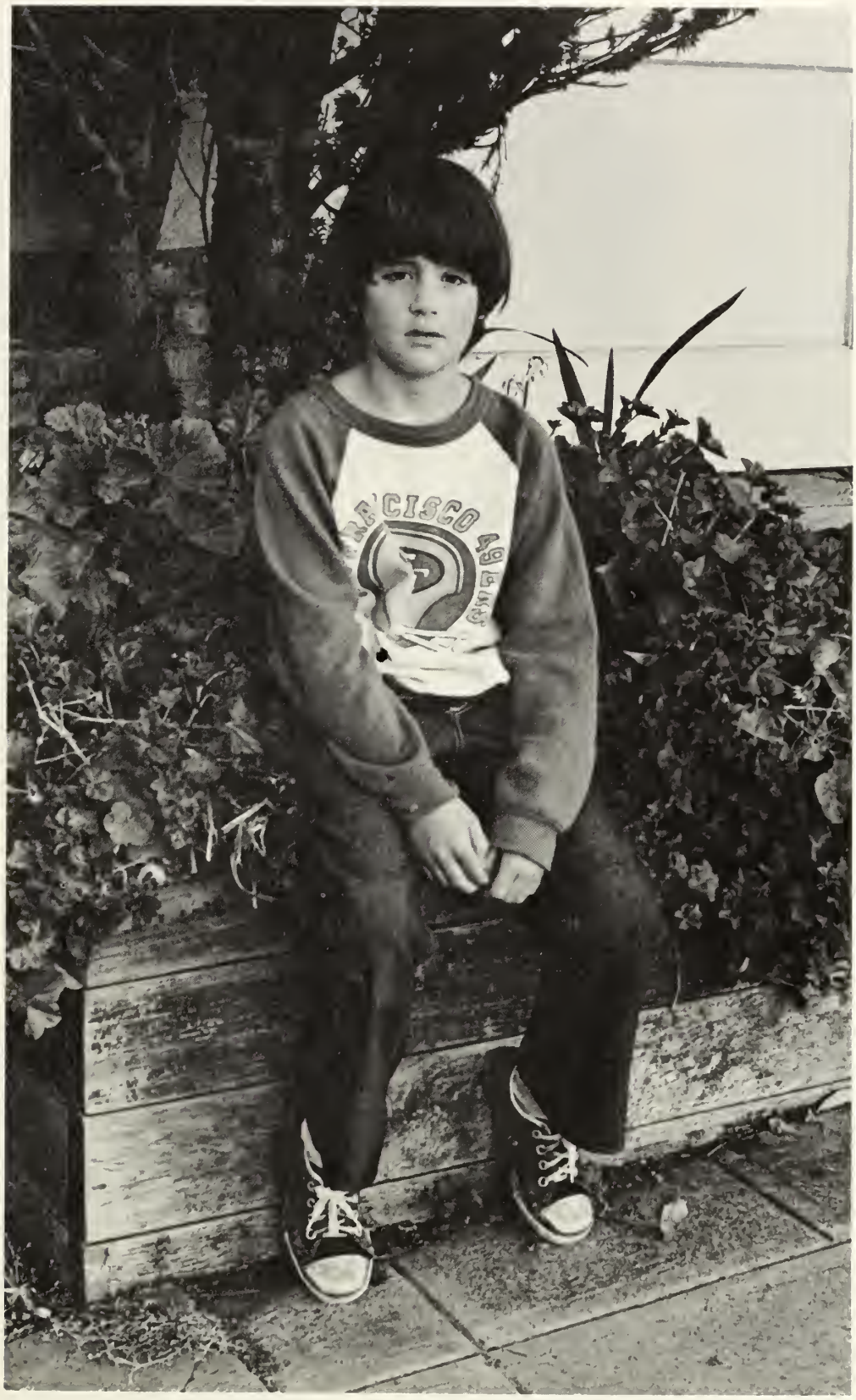
Chandra Ghosh ∴

Juliana Gallin

Another wild party at John's house

JOHN KIRK






JEFF BROWN

# KENDRA

Haight street Sat. 3a.m.

ClichéReggae, twoA.M.termpapers

Mr. Nelson's lecture on the sexuality of male dogs, Phallic Calculus

Nelson on human sexuality and muscle spasms,

*"Why are we all dying to live when we're just living to die?"*
*Edgar Winter*

*"I don't wanna wait anymore"*
*The Tubes*

*"Most vagabonds I know don't ever want to find the culprit that remains the object of their long relentless quest, the obsession's in the searching and not the aprehending."*
*Foreign Affair by Manhattan Transfer*

I'll miss you all!!!!!!!

The end of forbidden parties.....

*"Directing motive the end and aim of capitalist production, is to extract the greatest possible ammount of surplus-value, and consequently to exploit labor-power to the greatest possible extent"*
*Karl Marx*

*"There's gotta be something better than this. Hey big spender!!!!!!! If my friends could see me now!!!"*
*Neil Simon's Sweet Charity*

changing hairstyles and raps.....

Marchase on everything but!!!!!!!!!

*"Times have changed and we've often rewound the clock"*
*Anything Goes*

*"Sitting on the floor and talking til dawn, candles and confidences"*
*Love Song from Pippin*

The private water hole at senior retreat, Agent Orange

Hey Babies! Sigmund sweety.....

The absence of Zelerbach's

*"I am comfortably numb"*
*Pink Floyd*

*"Remember the Angel Rafael and do that which is good"*
*Arthur Miller's*
*The Crucible*
*(Tom Fine)*

Alana Trumbull

Shubert, Vivaldi and Gibbons

BARRY GLICKMAN

"IF YOU DON'T OPEN YOUR MOUTH,
YOU CAN'T PUT YOUR FOOT IN IT."
-AUSTIN O'MALLY

EDWARD
WHEELS
RÁUL
CANAPARY

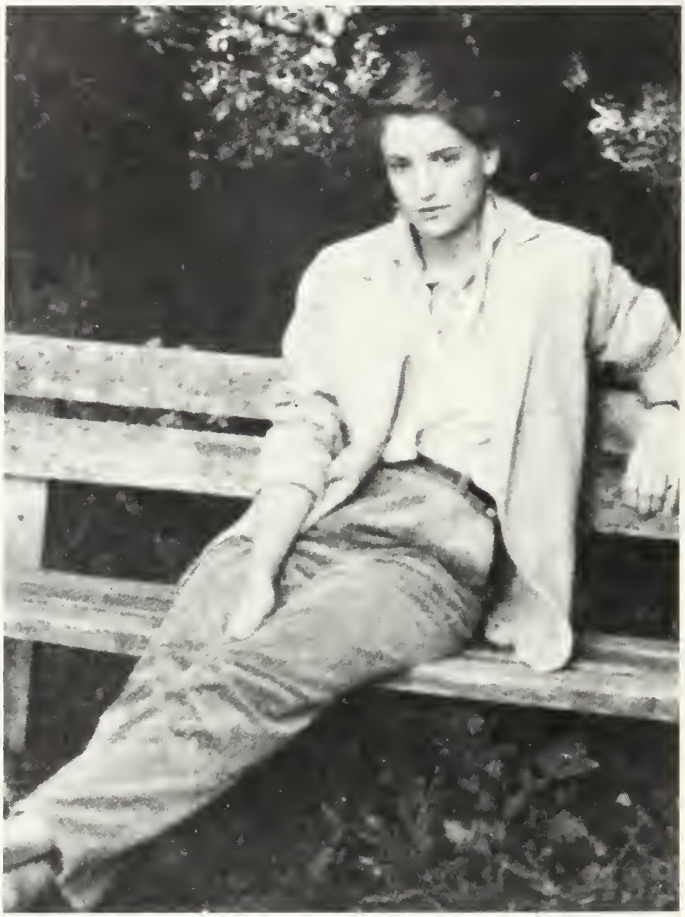
SARAH NORTON

JOANNA DAVIS

MARVIN TAM

street corners
one-way streets
the cruising vessel (formerly T.P.M)
Moronic Television
THE mainframe (Gee, Pretty Awesome)

PETER YOLLES



MELANIE SCARDINA

ALONA KAGAN

JACK KOFMAN

ROBERT SMIK

JACOB MICHAELS

IN MEMORIUM: THE LICK-WILMERDING
CROSS-COUNTRY TEAM.

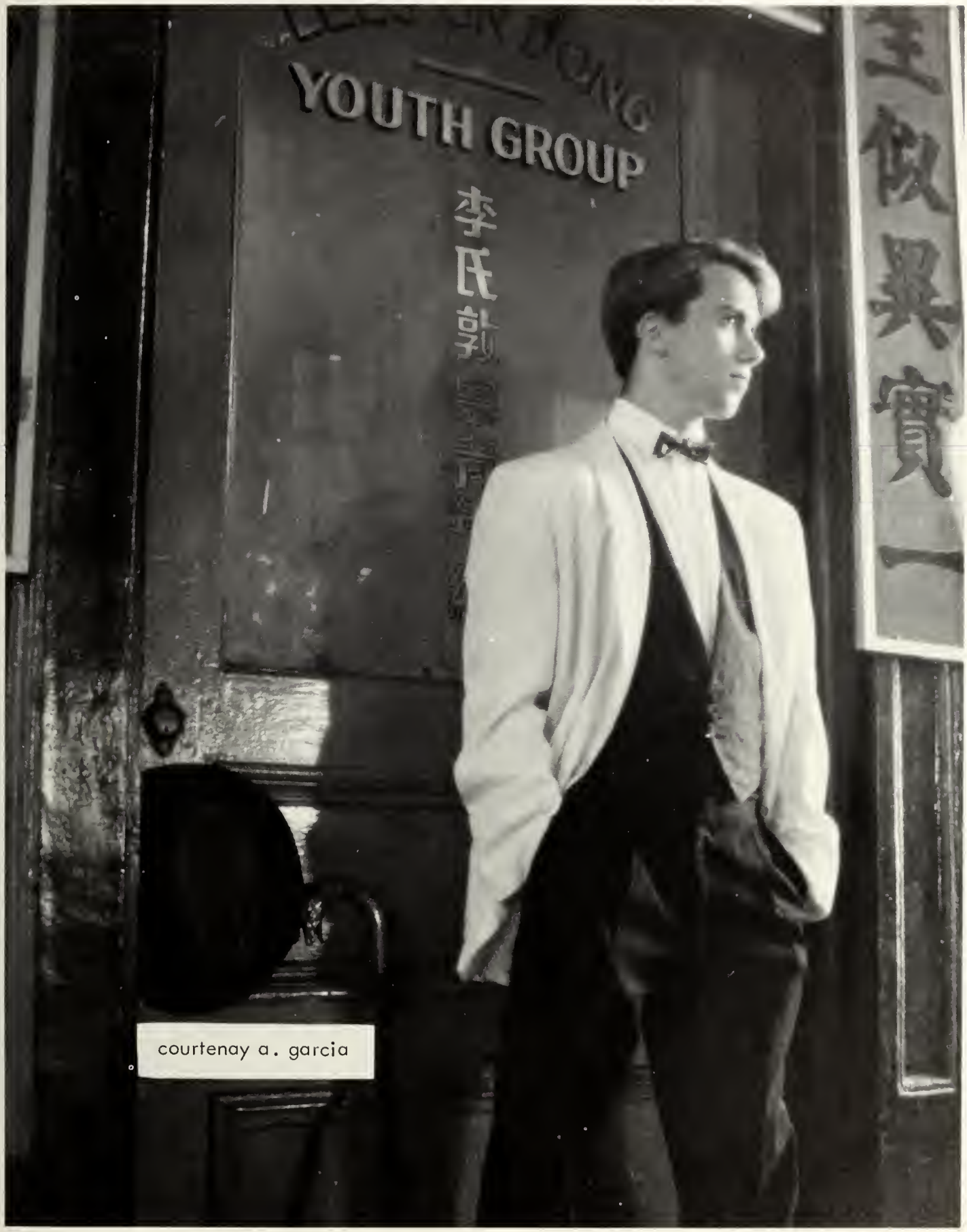
CLIFF NG

CHRISTOPHER YATES

SEAN VISSER

WHOOPS YOU REALLY GONE
AND DONE IT NOW
A BEAUTIFUL RELATIONSHIP
HAS ENDED ARE YOU SORRY
I THINK ITS TIME FOR
YOU TO TAKE A BOW
YOU'VE FOUND YOURSELF
SOMEBODY ELSE
SO YOU DON'T HAVE TO WORRY!!
— BAD MANNERS

MARC SCHNEIDMAN




courtenay a. garcia

SCOTT HARRIS

AND NOW, FOR YOUR READING PLEASURE, A POEM DEPICTING THE CHARACTER OF AN AVERAGE A.P. PASCAL STUDENT (PASCIE):

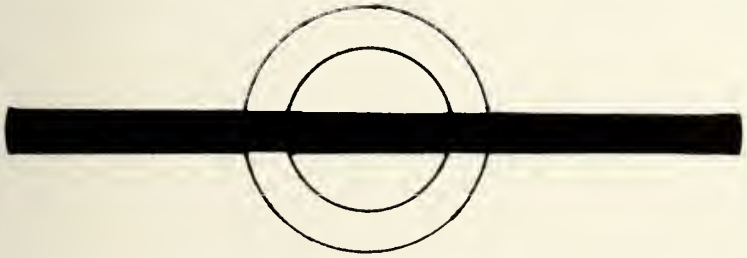
"WE PASCIES ARE A HAIRY FOLK
WHO LIKE TO EAT UNTIL WE CHOKE.
LOVING ALL LIKE FRIEND AND BROTHER,
AND HARDLY EVER EAT EACH OTHER.

EVER HUNGRY, EVER THIRSTING,
NEVER STOP 'TILL BELLY'S BURSTING.
CHEWING CHOP AND PORK AND MUTTONS,
A MERRY BUNCH OF BORING GLUTTONS.

PASCIES GATHER ROUND THE TABLE,
EAT AS MUCH AS YOU ARE ABLE.
GORGE YOURSELVES FROM MOON 'TILL NOON
(DON'T FORGET YOUR PLATE AND SPOON).

ANYTHING EDIBLE, WE'VE GOT DIBS ON,
AND HOPE WE ALL DIE WITH OUR BIBS ON.
EVER GAY, WE'LL NEVER GROW UP,
COME! AND SING AND PLAY AND THROW-UP!
(INSPIRED BY *BORED OF THE RINGS)*

PRE-PUBESCENT PISTON PUSHER: "WANNA DRAG?"



CTHULHU FOR PRESIDENT

トニー
ストリンガ

WHO IS THIS LITTLE KID ANYWAY?? DAVID MEANEY

KARL MAYER

MY RAPS AS FRESH AS WONDER BREAD../.. NOW WHO'S THE BEST PILOT YOU EVER SAW?
GORDO "HOT DOG" COOPER

IT'S BEEN SAID PUTTING A FILTER ON A CAMEL IS LIKE SLAPPING TRAINING WHEELS ON A HARLEY. . . ." NOTHING RINGS AS TRUE AS SILENCE."
- THE BEAT

NO BUCKS, NO BUCK ROGERS
- SCOTT CROSSFIELD

"LET'S GO UP"
"NO!"
"Why?"
"WE MIGHT DIE"

"Socialism is evenly divided POVERTY"
- J. FALWELL

"THAT CATCH-22 IS SOME CATCH"
"It's the best there is"
- JOSEPH HELLER

BYE FM2

DON'T DON'T DO IT OR DON'T DO IT?
"Physically we can find nothing wrong with it, but mentally it is one of the most harmful substances we have ever seen"..
Scientific American

WHERE AM I? GLAZZED[1] DO-NUTS, WHERE?
- G. NELSON
- G. TYROGALAS

"AND DON'T FORGET THOSE BOOKS, you KNOW, THE ONES you NEVER LOOK AT" "OR NEED"
- RAY MARCHESE
- Anon. phys. student

1 joke

YEARBOOK STAFF '85 . . . WHAT A FEELING!

FROM LEFT TO RIGHT: ALEX STUDER (PROOFREADER AT LARGE), FRED McCREA (HOYT THE EDITOR), JULIET "TOE-JAM" JAMSHEED (THE TYPIST, THE BACKBONE), ANGELIQUE PEREA (BEWARE! PROOFREADER ON GUARD), LESLIE SPICER (LIBERATED PROOFREADER), GARO ELDEMIR (THE UN-EDITED EDITOR), ROLF PENN (THE PEN IS MIGHTIER THAN THE STAFF).

# ACTIVITIES

### UMBROMANIA.

The idea of projecting the shadows of different objects (among others, the hands) upon a plane surface is very ancient, and it would be temerary to attempt to assign a date to the creation of these animals and classic figures, such as the rabbit, swan, negro, etc., that have served to amuse children in the evening since time immemorial.

Within a few years, these rude figures have been improved, and we are going to show how the play of shadows has now become a true art instead of a simple diversion. The Italian painter Campi was one of the first who thought of adding new types to the collection of figures capable of being made with the shadow of the hands. He devised amusing forms of animals that delighted the school children before whom he loved to exhibit them. His imitator, Frizze, imported the nascent art into Belgium, and it was in this latter country that our countryman, Trewey, got his knowledge of it.

Trewey was not long in discovering that umbromania [illegible] an effort is made to bend the middle and ring fingers, while the fore and little fingers remain extended.

The third exercise consists in bending solely the two last joints of the fore and little fingers, while the ring and middle fingers are bent inwardly. In this position, if the thumb be bent inwardly, it will be found that the shadow made by this profile on the wall will form the head of a cat.

The fourth exercise consists in leaving the two last joints of the first and little fingers bent, and in extending the middle and ring fingers. Afterward follow exercises in separating the fingers from each other by opening them in the direction of the width of the hand. First, it is the little finger that is isolated, the fore, ring, and middle fingers resting against each other; then it is the separation of the fingers into two groups, the little finger against the ring finger, and the middle against the fore finger, the latter and the ring finger making as wide an angle [illegible] in to this motion, he not only can form the most diverse figures upon a screen, but can also give them motion and life. The swan smoothing its plumage, the bird taking flight, the cat making its toilet, the tight rope dancer, who, after saluting the public, rubs chalk on her feet before walking on to the rope, are true wonders, and it is hard to believe that these perfectly accurate profiles are obtained solely by means of the shadow of the hands. The artist has thus far devised more than 300 figures, and his inventive mind is leading him to get up new ones every day.

Fig. 4.—TREWEY EXHIBITING UPON A STAGE.

Instead of reproducing a large number of these, we have thought it would be better to devote ourselves to the study of one in particular, in order to initiate our readers the more perfectly into the art of umbromania. Let us, for example, take the dog's head represented in Fig. 1 (No. 1). The ears are erect, the snout is thrust forward, and we conjecture that the animal has just scented a choice bit. In fact, he is snapping at it, and No. 2 shows us the efforts that he is making to swallow his prey, which is represented by the angle of the bent forefinger that moves in the mouth. After strong efforts, the [illegible] must be naturally endowed with great manual dexterity, without which the preparatory exercises would give no result. There are signs by which such dexterity is recognized, and an attentive examination of Trewey's hand has enabled us to verify the laws laid down by Mr. H. Etienne upon the native perfection of the senses. Thirty-five years of research have permitted Mr. Etienne, who has been continuously in contact, in shops, with Swiss watch makers' apprentices, experienced workmen, and artists even, to find a certain criterion by which to judge of aptitudes in different trades and several professions.

A young Frenchman who, after reverses of fortune, was

Fig. 1.—SHADOWS OF A DOG SWALLOWING A PIECE OF MEAT.

Fig. 2.—THE FISHERMAN.

Fig. 5.—THE PREACHER IN THE PULPIT.

Fig. 3.—FIGHT BETWEEN A JANITRESS AND TENANT.

FIRST ANNUAL SENIOR RETREAT SEPTEMBER 21-23
MOUNTAIN HOME RANCH, CALISTOGA, CALIFORNIA

FROM TOP, LEFT TO RIGHT: NATASHA ZASLOVE, BLAKE WHITMONT, PAUL GRAF, DAN FIELD, ALEX STUDER, PHIL GALANTE, JAMAL WALKER, ROW 2: STACEY MAYER, RAMONA BURNELL, LISA CHEW, SUSAN FELKER, LESLIE SPICER, REBECCA FIELD, JENNIFER SCOBLE, ANNA WHITCHER, ROW 3: CHRISTINE CASEY, SUZANNE TELLES, CINDY WONG, LISA BORAH, CAROLYN HOLM, CYBELE HIJAR, REBECCA TOON, ROW 4: ELLEN WILL, CHRISTINE LYNCH, CHIARA CALANCHINI, VANESSA de HARVEN, BONNIE JUE, ANGEL MORTEL, ROBYN LUTZ. NOT PICTURED: MAURA BAIRLEY, JASON KORDELOS. INSTUMENTALISTS: KATIE CLARK, SARAH BOUSHEY, EMIKO SEKINO.

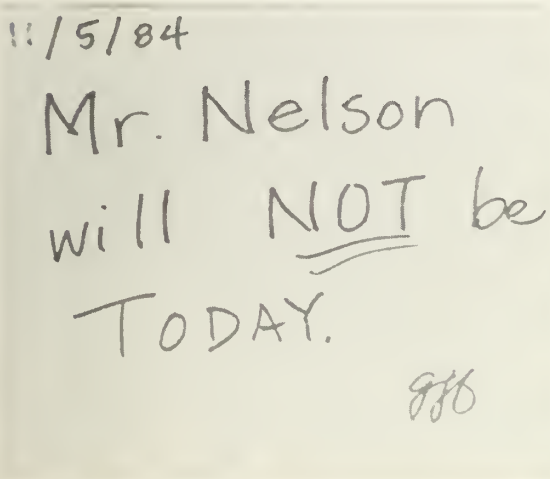
THE MADRIGAL SINGERS

KATHERINE HEATER, SARAH BOUSHEY, ILANA TRUMBULL

ONE SINGULAR SENSATION

TOTO, I DON'T THINK WERE IN KANSAS ANYMORE . . .

LITERARY CLUB — FROM LEFT TO RIGHT, TOP ROW: STEVE NICHOLSON, ERIK DREHER, ROD WYLLIE, LISA PAGAN, JULIE HOLZKNECHT, SEAN RIORDAN, ETHAN NOSOWSKY, MALCOLM DUNNE, JORDAN WINER, BOTTOM: AMY WYLER, JEANNE BELL, PAIGE RAUSSER, GRETCHEN JOHNSON, KARL MAYER, SEAN BLACKMAN.



CASA DE LAS MADRES FOOD DRIVE WINNERS — CLASS OF 86

# ADVISING

# GROUPS

LEFT TO RIGHT TOP: AUDREY ROSENTHAL, LANSE LONG, REBECCA FIELD, CHANDRA GHOSH, EMIKO SEKINO, JULIE MALORK, MIDDLE: DERICE SEID, CONSTANTINE GILLESPIE, BEN KLAU, KAREN GOODMAN, JAQUIN HASKELL, LINDA SHINN, JESSICA MACDERMID BOTTOM: ANN MAISEL (ADVISOR). NOAH POSTYN (ABSENT)

LEFT TO RIGHT: LUCY KYNE, JEFFREY TUCKER, KIMBERLY WONG, ELLA TIDEMAN, HEMAN CHOW, LISA PAGAN, CHRISTINE SMITH (ADVISOR), ATHAR KHALIQ, JULIE HOLSTEIN, JACK HOUNG, PAUL GRAF, ALAN DENSON.

FROM LEFT: ETHAN NOSOWSKY, GREG NELSON (ADVISOR), FRED McCREA, ALEXANDRA SCHULTHEIS, DAVID JOHNSON, MARC SCHNEIDMAN, KAREN YORN, ERIK DREHER, JOANNA DAVIS, SHIRIM NOTHENBERG, BARRY GLICKMAN, PIA McDONALD (ABSENT).

CLOCKWISE: ETHAN CUTTS, JENNIFER GUITTARD, CHIARA CALANCHINI, STACEY MAYER, CHRISTINE CASEY, AMY BOHLEN, ELEANOR McBRIDE (ADVISOR), LISA CHEW, EDWARD CANAPARY, REUBEN JACOBSON, TOM ALLEN, ABSENT: JASON DEWEES, ANGELIQUE PEREA, SEAN VISSER.

TOP: ROBERT SMIK, JACK KOFMAN, SHANE AHERN, MIDDLE: PETER STONE, KARL MAYER, JACK LaPEDIS, BRIAN SCHILLER BOTTOM: DOUG SILVERSTEIN, SARAH McCREA, ANGEL MORTEL, ROMANY HALL, DON TAYLOR (ADVISOR).

CLOCKWISE FROM BOTTOM: DAVID KNOWLES, DAVID FALIK, KIRSTEN PADGETT, SEAN BLACKMAN, RODERICK WYLLIE, KARL TEDE, RAD HALL, PETER GRIMES, GIA PHUONG, BLAKE WHITMONT, GEORGIANA OSIPOVA (ADVISOR) CHRISTINA LYNCH.

FROM LEFT: ANTHONY GRANT, LORILYN SEID, SEAN RIORDAN, ELIZABETH CORNELL (ADVISOR), JILL MINKUS, JEFF HALL, BRIANA VISSER, NAVDEEP GILL, JESSICA GRIMES, TERESA STRASSER, KAITANA HAWKINS, ADAM GASNER (ABSENT), ERIC MARTON.

BACK FROM LEFT: DANIEL FIELD, EUGENE LEE, ERICH STRATMANN, JAIME THURSTON, KRISTINE DOUGHERTY, KATHERINE HEATER, ELEANOR BURKE (ADVISOR), FRONT FROM LEFT: LAURA WALD, WELLESLEY ROGERS, RACHEL WARD, ELLEN WILL, DEIRDRE VISSER

CLOCKWISE: CLIFTON NG, RON CZISKA, JAMES WHITTEN, SARAH NORTON, JASON KORDELOS, JENNIFER LEMPERT, LYLA MAX, MARTIN PLACK, WILLIAM CHUCHWAR (ADVISOR), KEN OSTRAT

LEFT TO RIGHT: MARY WALSH, ELIZABETH MERCHANT, CAROLE SUNG, TRACY NAGLE, JASON CURTICE, MARK FUJIWARA, JAMES CUTTS, ERIC SPROSS, LOUIS GRIM, ED KRIMEN, ERIC GLASER, PHILIP COATES (ADVISOR)

BACK ROW: PHILIP PERA, ANDRE BROWN, WILLIAM CRAIN, JOHN MORALES, ANTHONY PERLISS, MME. DONALDS (ADVISOR) MIDDLE ROW: ALISON FINNEGAN, SARAH BOUSHEY, CYBELE HIJAR, ANNA YATROUSSIS, CYNTHIA WONG, FRONT ROW: ANNA WHITCHER, DYLAN MORRISON.

FROM LEFT: EVAN HUNT, DANIELLE HARLEMAN, MONIKA ZEMSKY, CERRAH MENDELSOHN, JEFF GOLDBECK, DOC ELLIS (ADVISOR), JEFF BROWN, SUSAN FELKER, ERIK BLEYLE, MARILYN S. LUZZIO, CATHERINE CLARK, LESLIE COMBS, PETER YOLLES, DIMITRI KATZ.

LEFT TO RIGHT: JUSTINE TIDEMAN, MATTHEW LORINCZ, NEIL TALBOT, JACOB MICHAELS, DAVID SCHWARZBACH, TONY STRINGER, ILANA TRUMBLE, MARVIN TAM, MICHAEL CUTLER, JULIANA GALLIN, RAY MARCHESE (ADVISOR), JULIE WOLFE, JOANNA DAVIS.

LEFT TO RIGHT: KATHERINE JARRETT (ADVISOR), MARK LOVEJOY, ERIC YOUNG, JEFF HYMAN, MARTIN McCOY, JAMES MITCHELL, NICOLE LEVINE, JACQUELYN BRODSKY, LINDA DETJEN, JULIA DALLMAN.

*PEER COUNSELING*
TOP ROW: MARCAIL McELHATTEN, JENNIFER SCOBLE, SAMANTHA YATES, APRIL KENT, BLAKE RESPINI (COUNSELOR) SECOND ROW: MATT SEGAL, ELIZABETH REVELL, STEPHANIE SNOW, LISA BORAH, MAUREEN POPPERS (COUNSELOR) THIRD ROW: BRONWYN SHIELDS, JENNIFER DUNN, ROBYN LUTZ

LEFT TO RIGHT: KENDRA KURIHARA, GARO ELDEMIR, JOHN KIRK, MALCOLM DUNNE, RAMONA BURNELL, DR. RALPH FORSYTHE (ADVISOR), SCOTT HARRIS, JOCELIZA GONZAGA, DEANNE FRANK ABSENT: SHARIN DINWIDDLE-MARIN

MORGAN WHITMONT, GARY CHAVEZ, CARY CORDOVA, TINA FELCH, ANDREW LIE, JESSICA COHEN, JOANNE FONG, KAY FRANCHESCI (ADVISOR), TODD FILLEY, KIMBERLY FULGHUM, ADAM FRANKEL, BELLA DOSHI, INNA GORODETSKY.

CHRISTINE TAM, REBECCA TOON, DANIEL CASEY, SARA SIEBEL, JONATHAN YOLLES, CHRIS HARTLEY, OLEG OSIPOFF (ADVISOR), LAUREL THOMPSON, VANESSA de HARVEN, JODIE STEINER, NIEL LAWRY, BECKY SILVERMAN.

LEFT: BACK FROM LEFT: ANGELE PASTORE (ADVISOR), ARTHUR ELLIS, SUZANNE TELLES, DAVID MEANEY, ALONA KAGAN, COURTENAY GARCIA, DANIELLE LACAMPAGNE FRONT: JULIE HOLZKNECHT, MIKE WEBB, CHRIS YATES.

LEFT: MIKE ZWERIN, DAVID BRANNER, MICHEL BLACK, AMY BENTON, LISETTE BAHAMONDES, MAURA BAIRLEY, DAY ALEXANDER, MAX KLASSEN, STUART HAYNES (ADVISOR), MELVIN BACON, SARAH ARMSTRONG (ABSENT).

FROM LEFT TO RIGHT: JARED BROWN, CAROLYN HOLM, MICHELLE TONG, ALAN ARONOFF, GRANT HOUGH, BONNIE JUE, ALEX HOCHMAN, JUSTIN GROVER, CONNIE JOHNSON, STEVE SIMON (ADVISOR), NICOLETTA KARAM.

FROM LEFT TO RIGHT: DON SEWARD, LESLIE SPICER, LEONIE GARRIGUES, SUSANNA KHAVUL, JACKIE LLOYD, BRIAN GONZALEZ, JASON WADE, ROBERT HART, TODD ANDERSON, MARINO SICHI (ADVISOR), NINA WOODFORD, RANDY GEUY (ABSENT).

CLOCKWISE FROM LEFT TO RIGHT: CHRISTOPHER MOY, AARA AMIDI-NOURI, TRINA ZERGA, SAM YOUNG, JASON TEPLITSKY, ORCA (MARY KAY) JANIAK, GRETCHEN JOHNSON, JOEL WEISS (ADVISOR), JASON GULLION, ARIELA FREED, WALLY MacDERMID, RUDY WILSON, SHANDOR SZENTKUTI.

FROM LEFT: CHRIS KENT, JAMAL WALKER, EMILIE CLARK, GORDON SZETO, DAVIS KARREN, JEANE BELL, NICOLE LeBORDE, NANCY STEELE (ADVISOR), EMILY MARSH, PANDORA BEDNAR, DAVID BROWN.

FROM LEFT TO RIGHT: UTE von DOYEN (ADVISOR), PAIGE RAUSSER, MELANIE SCARDINA, KEITH MUELLER, MATHIAS CLASEN, GERTRUDE JAMSMASH, ADINA CARTER, ALEX STUDER, PAUL KINGSBURY, SCOTT FRANK (ABSENT), EUGENE O'BRIEN (ABSENT)

LEFT TO RIGHT: RICHARD HOUNG, GEORGE TYROGALAS (ADVISOR), PHILIP GALANTE, MOHAMMED BILAL, NATASHA ZASLOVE, MORGAN ROBERTSON, ROGER CHALLENDER, KIRSTEN MAYER, STEPHEN HAAS, JENNIFER KIRBY, YUMIKO SEKINO, AMY CARLSON, PATRICIA NGO.

# ABSENTEES

SCOTT FRANK, ANGELIQUE PEREA, ADAM GASNER, ROBIN COWEN,JORDAN WINER.

SHARINE DINWIDDLE-MARIN, BEN LORVAN, SARAH ARMSTRONG, RANDY GEUY.

SEAN VISSER, AMY WYLER, JASON DEWEES, EUGENE O'BRIEN, SUSAN ELLIS.

THANK YOU MR. AND MRS. VULJAN

OXFAM LUNCHEON 1984

ANNUAL SQUARE DANCE

# SPORTS

### A SINGHALESE YACHT.

In these days of yachting we have thought it might be of interest to our readers to see what sort of a yacht they sometimes use in Ceylon.

The fishermen (who form a caste of their own) in Ceylon lead a somewhat hazardous existence. They frequently run great risks when the waves break heavily over the reefs by which the island is almost entirely surrounded. That they earn their bread by the sweat of their brow the enterprising traveler will be easily convinced of if he is rash enough to accompany Singhalese fishermen on one of their trips, as they are generally out for hours during the heat of the day. The boats have in themselves no stability, having only about 8 inches beam, and are kept from capsizing by an outrigger. In the event of a heavy squall, when the outrigger is not sufficient for the preservation of stability, one of the crew acts as shifting ballast, and perches himself on the outrigger—this is called a one man breeze. A two man breeze is serious work. The construction of these boats enables them to run over the shallow reef water, and our sketch shows the passage of a river bar under sail, the boat being rushed through the "white horses" at a rapid pace under the freshening gale. It is rather exciting work when, amid the green rollers on the bar, naught of the land can be seen in dipping save the tops of the cocoa nuts that fringe the shore. The Singhalese fishing boat has a graceful motion, but it is best admired from *terra firma*. He who takes a trip in one of these craft invariably has a pensive feeling on return, followed by complete prostration, but still it is a sensation worth undergoing. Our engraving is from a sketch by Colonel H. G. Robley, commanding First Argyle and Sutherland Highlanders.—*London Graphic.*

A CEYLON SURF BOAT.

BOYS CROSS COUNTRY:
TOP ROW: COACH BLAKE RESPINI, FREDDIE MCREA, COURTENAY GARCIA, MARVIN TAM, BOTTOM ROW: JACOB MICHAELS, CLIFTON NG, TOM ALLEN, JOHN KIRK, DIMITRI KATZ (ABSENT)

GIRLS CROSS COUNTRY:
TOP ROW: CONNIE JOHNSON, ELIZABETH MERCHANT, CHANDRA GOSH, BOTTOM ROW: NICOLE LEVINE, LORI SEID, ELLEN WILL, ANN YATROUSSIS.

VARSITY SOCCER TOP: (COACH) LEN RENERY, PETER STONE, PETER YOLLES, BARRY GLICKMAN, DAVID MEANY, STEPHEN HAAS, ROBERT SMIK, JACK KOFMAN, ANDRE BROWN, WATER-BOY BOTTOM: NOAH POSTYN, DAVID SCHWARZBACH, EDWARD CANAPARY, MIKE WEBB, MALCOLM DUNNE, KARL MAYER, CHRIS BAKER, MIKE ZWERIN

JUNIOR VARSITY SOCCER TOP: (COACH) STEFAN HANSSON, MIKE ZWERIN, MARK LOVEJOY, WALLY MACDERMID, MALCOLM DUNNE, BLAKE WHITMONT, CONSTANTINE GILLESPIE, PAUL GRAF, GROUNDS-KEEPER, BOTTOM: CHRIS HARTLEY, DAVID KAREN, ADAM FRANKEL, ALAN ARONOFF, SEAN RIORDAN, JOHNNY YOLLES

GIRLS VARSITY VOLLEYBALL: TOP ROW: JENNIFER GUITARD, KIRSTEN MAYER, MARY KAY JANIAK, KAITANA HAWKINS, AMY BENTON, BOTTOM ROW: MICHELLE TONG, ANGEL MORTEL, ROMANY HALL, JEANNE BELL, JOCELIZA GONZAGA, (COACH) DON TAYLOR

GIRLS JUNIOR VARSITY VOLLEYBALL: FROM LEFT: KAY FRANCHESCI (COACH), DENISE BRODSKY, KIMBERLY FULGHUM, YUMIKO SEKINO, GRETCHEN JOHNSON, BRIANA VISSER, NATASHA ZASLOVE, DANIELLE HARLEMAN, JENNIFER SCOBLE, TRACY NAGLE, ANNA WHITCHER, WELLESLEY ROGERS, DEIRDRE VISSER.

VARSITY BASKETBALL: TOP ROW: JEFF BROWN, SHANE AHERN, JACK LaPEDIS, BARRY GLICKMAN, LANSE LONG, BOTTOM: RONALD CZISKA, DAVID SCHWARZBACH, MIKE WEBB, KARL MAYER, PETER STONE, COACH DON TAYLOR.

JUNIOR VARSITY BASKETBALL: FROM LEFT: GRANT HOUGH, ADAM FRANKEL, RICHARD HOUNG, BRIAN GONZALES, ED KRIMEN, RAD HALL, DAVID BRANNER, MOHAMMED BILAL, JIM MITCHELL, PETER GRIMES, TONY GRANT. ABSENT: COACH MATHEW RENO.

22
20
34

LICK
20
34

34

22
34

LICK

VARSITY BASKETBALL FROM LEFT TO RIGHT TOP: AMY WYLER, JEANNE BELL, MICHELLE TONG, DEIRDRE VISSER, KIRSTEN MAYER, GRETCHEN JOHNSON, ROMANY HALL, MARY-KAY JANIAK, BRIANA VISSER, JESSICA GRIMES (MISSING) CHRISTINE CASEY (TOP CENTER)

JUNIOR VARSITY: FIRST ROW: DANIELLE LACAMPAGNE, AMY BENTON, SECOND ROW: JULIA DALLMAN, CHRISTINE TAM, LISA PAGAN, JODIE STEINER, THIRD ROW: COACH McDUFFY, MICHELLE BLACK, NICOLE LEVINE, BOTTOM: JENNIFER KIRBY, JENNIFER SCOBLE.

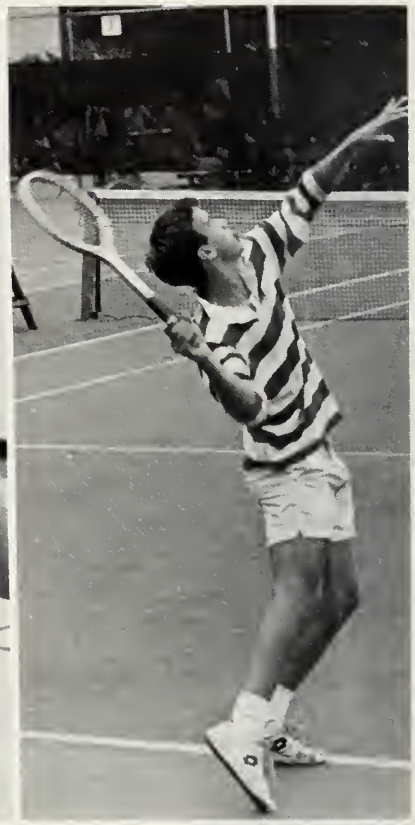
RINCON

RINCON

TIGERS
10

TIGERS
21

15



SPRING SPORTS 84

# EDITOR'S PAGE

WELL, THE 100th year yearbook staff has finally finished the honorable task of depicting the school year of '84 and '85. We would like to thank many people for their invaluable aid: Juliet Jamsheed, Leslie Spicer, Alex Studer, Angelique Perea and of course Mr. Penn.

And for art we thank:
Julianna Gallin

Fred McRae
Jeff Palmer

WE also would like to mention a few other individuals who contributed their talent to this book: "Charles" David Brown, for his excellent photography and Malcolm Dunne, Eric Dreher, Dan Casey, Richard Houng, and Jeff Hyman for theirs.

EDITOR'S PAGE

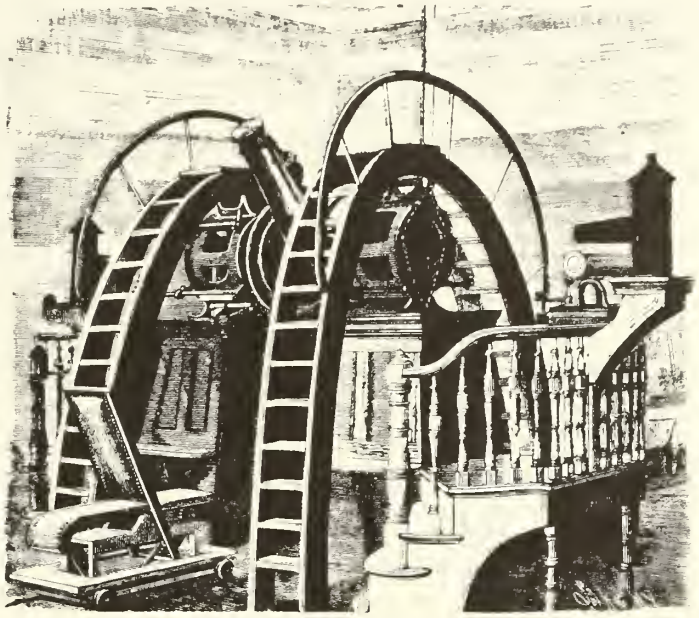
## THE LICK OBSERVATORY.

(*Continued from first page.*)

which rises above his remains as a fitting monument to one of the world's greatest benefactors and philanthropists.

In administering their trust the custodians met with legal obstacles and suits brought by his relatives. These delayed the carrying out of his plans, but eventually a settlement was reached. On June 30, 1883, the corner stone of the observatory, to which this article is devoted, was laid, and to-day the work is practically complete. When Mount Hamilton was selected as the site for the Lick Observatory, in order to test its atmospheric conditions, Professor S. W. Burnham, the discoverer of many double stars, was invited to observe there in 1879. Owing to the dryness of the air, and its excellent quality for astronomical work, his six inch telescope described many stars, catalogued by Professor Otto Struve as double, into triple stars. Mr. Lick died in 1876, and the original plans for the observatory were determined by Captain Richard S. Floyd, president of the trustees, and Mr. T. E. Fraser, superintendent of construction, acting under the advice of Professor Edward S. Holden, and Professor Simon Newcomb, of the Naval Observatory, in Washington. Many noted astronomers have been interested in the work, and this will probably be the most famous observatory in the world. It owns about 1,550 acres of land, a portion of which will eventually be made into a public park, and the graded road of twenty-six miles leading to the summit of Mount Hamilton from San Jose may, perhaps, become a direct route to the Yosemite Valley. Since 1880, when the work was first begun, 7,000 tons of rock and earth have been removed to level a plateau upon which the buildings stand. They are constructed of solid masonry, and are of simple but effective architecture, and include the main building—287 feet long—containing the directors' and secretary's offices, the library, clock rooms, etc., with the large dome at its southern end for the large telescope, and a smaller dome for the 12 inch equatorial at the northwest corner, the meridian circle house, the transit house, the photographic laboratory, and several temporary wooden workshops. The dwelling house of the astronomers, 63 × 60 feet, stands below the summit and is connected with the plateau by a bridge. The surrounding peaks have been named from several famous astronomers.

In speaking of the outlook from Observatory Peak, which is 4,302 feet in height, Professor Holden says: "It would be difficult to find in the whole world a more magnificent view than can be had from the summit just before sunrise, on one of our August mornings. The eastern sky is saffron and gold, with just a few thin horizontal bars of purple and rosy clouds. The sharp outlines of Copernicus and Kepler are seen in sharp profile against the brilliant background. Orion, Procyon, the Twins, Sirius, are in the morning sky, and Venus is brilliant and steady against the stars. The instant the sunbeams touch the horizon the whole panorama of the Sierra Nevada flashes out, 130 miles distant. Toward the south and west the beautiful valley of Santa Clara lies, dotted with farms and vineyards, and bordered toward the sea by Loma Prieta and the Santa Cruz Range. The winding road to San Jose, which takes twenty miles of twisting to accomplish the thirteen miles of air line, lies like a dusty snake at your feet. The Bay of San Francisco looks like a piece of a child's dissecting map, and is lost in the fogs near the city. The buildings of the city seem strangely placed in the midst of all the quiet beauty and the wild strength of the mountains. Then you catch a glimpse of the Pacific in the southwest and of countless minor ranges of mountains and hills that are scattered toward every point of the compass, while, if the atmosphere is especially clear, you can plainly see to the north Mount Shasta, 175 miles distant."

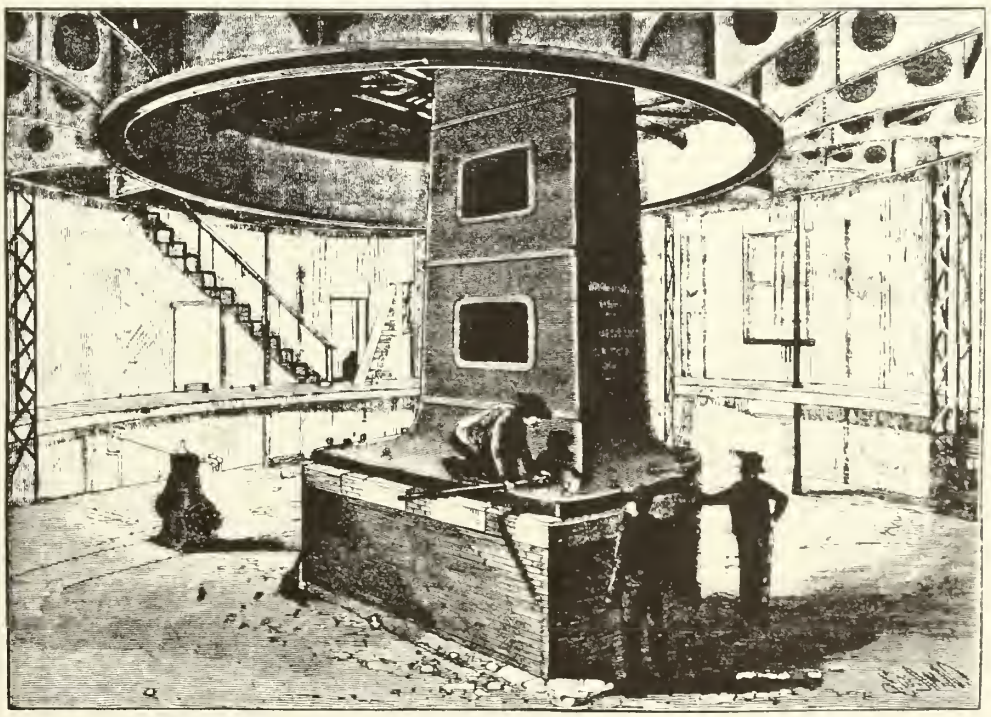


LICK OBSERVATORY—THE MERIDIAN INSTRUMENT.

The large dome, built by the Union Iron Works, of San Francisco, is 75 feet in diameter and its moving parts weigh 100 tons. It revolves upon wheels which run on hardened steel balls. A man merely pushing against it can move the entire dome. The usual motive power is obtained from a water engine which can rotate the dome 360° in less than 9 minutes. Its diameter changes ½ inch in the extreme change of temperature, and its track is given a smooth and oiled surface to slide upon. The observing slit is 9½ feet wide, and the pintle of the shutter is placed eccentrically. A practical device for carrying the observer to the eyepiece of the telescope, which at times is far above the base of the dome, was planned by Sir Howard Grubb, of Dublin. This is an elevating floor 61½ feet in diameter, weighing 50,000 pounds, and is moved up and down through a space of 16 feet. It is highly probable that the present system will not be sufficiently powerful to raise the flooring rapidly enough, but in this event the hydraulic system can be altered, or steam or electricity substituted. The actual speed required can only be determined after a series of experiments have been made.

The dome for the 12 inch equatorial is 25 feet wide, weighs 8 tons, and its observing slit, which extends beyond the zenith, is 3 feet wide. The meridian circle house is 43×38 feet. Its walls are double, the outer frame of galvanized iron, the inner one of California redwood. Between these is an air space 24 inches wide, which encircles the buildings. There is also an air space above the ceiling, which communicates with the room and with the air spaces of the walls, and on the west there is a ventilating tower two stories in height, which connects with the room of the meridian transit instrument. By these means the temperature of the building is kept the same as that of the external air. The transit house adjoining the meridian circle house is built of iron, with a wooden lining, and is arched by a curved shutter, which is controlled by levers, planned by Sir Howard Grubb. The photographic observatory, north of the transit house, is a small wooden building, with brick foundation. The tube of the photoheliograph telescope enters this house, and a brick pier supports the photoheliograph. A room in the second floor of the main building is also fitted for photography.

The large telescope, which embodies the expressed object of the $700,000 donation, was mounted by Warner & Swasey, of Cleveland. The tube is nearly cylindrical, and is 60 feet in length. There are three finders, 6, 4, and 3 inches in aperture, and in addition to these the 12 inch equatorial can be quickly attached, as a pointer, for photographic work if the controlled driving clock does not work satisfactorily. The lens is 36 inch clear aperture, being the largest object glass in the world, and has a 678 inch focus. The flint disk was obtained from Feil, in April, 1882, and after nineteen failures the crown glass disk was cast successfully in September, 1885. The third photographic crown lens was purchased from Feil in 1886, and broke while in the hands of the Clarks. The trustees of Yale University then offered their 27 inch flint glass to the Lick Observatory, but this was too yellow, and in 1887 Mr Alvan G. Clark bought in Paris, from Feil, the crown glass, which is worked into a third lens. In addition to its magnifying power and its perfect definition, *i. e.*, neatness, accuracy, etc., this telescope has great light-gathering power, and stars may be seen thro it which are 30,000 times fainter than the faintest seen by the naked eye, and the moon will appear under the same conditions as if it were seen by the naked eye at about 200 miles from the earth.



THE ELEVATING FLOOR—RAISED—AND THE GREAT TELESCOPE PIER.

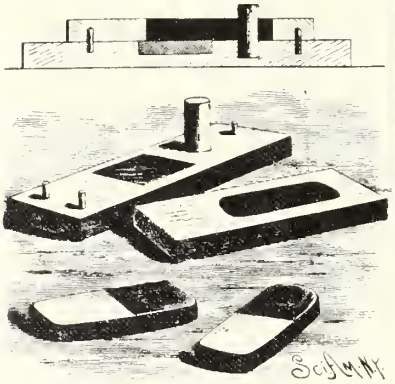
It is interesting to compare this telescope with the simple instrument made by Galileo in 1609, consisting of a single leaden tube with a plano-convex lens at one end for an object

glass, and a plano-concave lens at the other end for an eyepiece, and magnifying three times. Ever since Galileo's brilliant discoveries with this "optick tube," described by Milton in his visit to Padua, the growth of the telescope has been of steady progress, in spite of the opinion of a cotemporary professor of Galileo in the University of Padua, who argued that "things invisible to the naked eye are useless and do not exist." In tracing its development briefly we find that the difficulties in obtaining good glass led Newton to construct a reflecting telescope in 1688, which magnified 39 times, the speculum or mirror being made of an alloy of copper and tin. Improvements followed which finally resulted in Herschel's finely constructed instruments, in the large six foot reflector in its gigantic frame, made by Lord Rosse, and in the celebrated reflectors of the present time. The reflecting continued to supplant the refracting telescope until about 1753, when Dolland, an English optician, showed that lenses of flint and crown glass could be combined in such a manner that their dispersive powers would neutralize each other, and this is the principle of construction of the achromatic objective now in use, consisting of an outer double convex lens of crown glass and an inner lens nearly plano-concave of flint glass.

The 12 inch refractor, which was originally made for Dr. Henry Draper's private observatory at Hastings, N. Y., by Alvan Clark & Sons, is of the finest construction. The object glass of the 6½ inch equatorial was also made by the Clarks, and is provided with a portable mounting made by Warner & Swasey. The 4 inch comet seeker, made by Alvan Clark & Sons, has a focal length of 33 inches. The rays fall on a reflecting prism, and are bent into a horizontal plane. The eye of the observer moving in azimuth while the telescope is in altitude can cover the whole sky. The motion is effected by turning a crank. This was bought on Prof. Newcomb's recommendation.

The photoheliograph is mounted south of the transit house. The transit instrument determines the axis of the photoheliograph, and this is also used as a collimator for the transit. The 6 inch Repsold meridian circle was delivered in 1884, after having been inspected by Profs. Auwers and Krueger, of Berlin. The declinograph was made under the supervision of Dr. Johann Palisa, of Vienna, to fit either a 12 inch or 6 inch equatorial. The universal instrument made by Repsold consists of a telescope containing a prism, into which the rays of light are reflected. Its aperture is 2·15 inch. The horizontal circle reads by two microscopes to 2", and the circles are 10 inches in diameter. This is a perfect geodetic instrument, and together with a 6 inch equatorial and a chronometer can be easily packed for astronomical expeditions. There are several chronometers made by Negus, and a thermometric chronometer by C. Frodsham. The most important of the minor instruments are the filar micrometer for the 36 inch telescope by Fauth & Co., the duplex micrometer by Grubb, and a star spectroscope made by Brashear from designs of Mr. Keeler. Plans for a large solar spectroscope are being worked out by Prof. Holden and Prof. Langley. The other instruments are a delicate sphereometer by Fauth & Co.; resistance coils; galvanometers; a disk photometer; spectroscopes; a lever trier of refined construction; and an engine for measuring photographs, scales, etc., made by Stackpole & Bros., from designs of Prof. Harkness.

The meteorological instruments are: Self-registering rain gauges, wind gauges, barometers, and a number of thermometers. There is a complete set of apparatus for registering earthquakes, provided by the Cambridge Scientific Instrument Co., consisting of a horizontal seismograph with clock and driving plate, the clock being started by an electric contact at the beginning of a shock, and the two rectangular components of the horizontal motion then registering on a moving plate; a vertical seismograph to register vertical motions on a dial plate; a duplex pendulum seismograph to give independent records on a dial plate, the pencil being free to move in any azimuth; and a chronograph, which is set in motion at the beginning of an earthquake and records its duration upon a clock. The staff of the observatory consists of Prof. Edward S. Holden, director and chief astronomer; Samuel W. Burnham, James E. Keeler, John M. Schaeberle, and Edward E. Barnard, assistant astronomers; and C. B. Hill, secretary, librarian, and occasional observer.

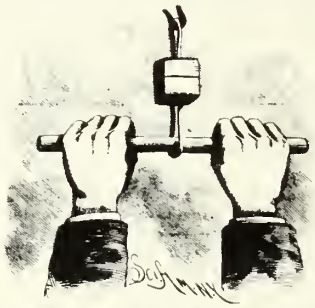


LEAD COHESION BLOCKS—THE MOULD.

Early in 1886, Prof. Holden made contracts with the Southern Pacific and other railroad companies for supplying time from the observatory by automatic electric signals. This regular time service, of which Mr. Keeler has charge, has been in operation since January, 1887. A great part of the apparatus used in this service forms an integral part of the observatory's equipment. The system which has thus been introduced has been of great service to that particular section of the country, as well as to the railroad companies.

JAMES LICK.

Instruments for recording earthquake shocks have been constructed by a company in San Francisco, and are sold at a very low figure. It is designed in this way that records of any seismic movements shall be procured by private individuals in different parts of the State, and plates upon which the movement has been recorded may be sent to the observatory, where a record will be kept of all such data, and blue prints will be made of the diagrams and copies of this sent to the person from whom the plate has been obtained. Although this is quite independent of the regular work of the observatory, it will doubtless lead to the accumulation of data which will be most important in formulating statistics for future use.



COHESION—BLOCKS SUSTAINING DIRECT STRAIN.

The great telescope has been mounted for several weeks, and several satisfactory tests of its capacity have been made. It was first directed to the sky on the evening of January 3, 1888, and a few observations were then made for the partial adjustment of the object glass, but the observation was abbreviated by the skies becoming cloudy. The next observations made were on the evening of the 7th. On this occasion Saturn was observed, and Mr. Keeler, who conducted the observation, says with rapture that it was "the most glorious telescopic spectacle ever beheld." He exclaims: "Not only was he shining with the brilliancy due to the great size of the objective, but the minutest details of his surface were visible with wonderful distinctness."

The outlines of the rings were very sharply defined. The most curious feature was the structure of the outer ring; at about one-fifth of its width from its outer edge, a fine dark line was discernible, which marked the beginning of the dark shading, diminishing in intensity up to the black line. The inner ring did not shade off gradually into the gauge ring, as often represented, but the line of separation was distinct. The space between its inner edge and the planet was perfectly black.

Much of the data given in this article was procured from Prof. Holden's report in the *Sidereal Messenger* and Mr. James E. Keeler's notes on his own observations in the same journal. The observatory with its apparatus and appurtenances is to be transferred, upon its completion, to the University of California and will in future be under the government of the regents of that institution. Prof. Holden resigned the presidency of the University in order to become director of the observatory.

## COHESION OF LEAD.

T. O'CONOR SLOANE, PH.D.

It has long been known that perfectly clean surfaces of lead, when pressed together, would adhere to each other with some force. The experiment ranks as one of the classics in simple science. A very good way to show it is with bullets. Small surfaces, flat and clean, are prepared on two bullets by cutting off a little slice with a knife. When pressed together with a wrenching motion, the two will remain attached. A third bullet may now be fastened to one of the pair, and in this way a string of bullets, six or more in length, can be built up.

As the phenomenon depends on the absolute cleanness of the surfaces, and as it is a case of adherence of like to like, it is often invoked as an illustration of cohesion. Pure India rubber shows the same tendency, but in a far stronger degree relatively speaking. Whether it is true cohesion or not is uncertain, especially in the case of lead.

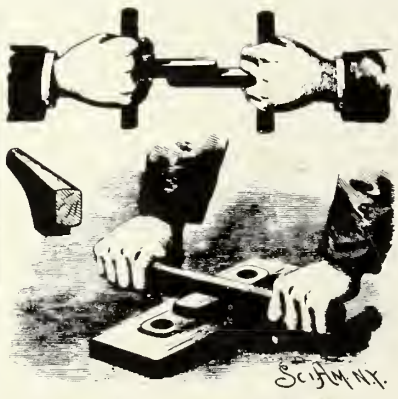
The method of obtaining this cohesion by employing mechanically prepared surfaces is a far less attractive method than the one which Faraday used in his lectures. He melted the lead and poured it out in two pieces upon a flat stone. After they had cooled, he pressed together the smooth lower surfaces of the lead, and thus obtained strong attachment. The flat plane on which the lead rested gave the essential true surface, while during the cooling it was perfectly protected from oxidation or dust. When lead is thus treated, even the upper surfaces which have been exposed to the air will answer for the experiment.

To make the phenomenon really impressive, it may be carried out on a larger scale. In the illustrations the necessary apparatus for conveniently doing this is shown. As mould for the face of the lead a polished block of metal is used. All things considered, this appears to work better than marble, which is the most available stone surface. A block of steel answers very well, and with use becomes slightly colored, as if by formation of magnetic oxide, and resists the rusting action of the atmosphere very well.

The metal block is set into a wooden base, so as to lie with its face even with the surface of the wood. Through a second piece of wood an oblong hole is cut. This should be about twice as long as it is wide. Its width should be equal to that of the metal block, or a shade less. When this is placed upon the base piece, so that the metal block lies at one of its ends and within the opening, the body of a mould is formed. Toward one end a round pin of wood is inserted. If lead is poured into the mould, it will assume an oblong form. Near one end will be a hole, and a face more or less smooth will be formed at its other end.

As regards size, a metallic block 1¼ inches square will answer for the face. The cavity of the mould should be about twice this length. A depth of from one-half to three-quarters of an inch is ample. The lead is melted and poured into the mould. As soon as solid the mould may be taken to pieces, the lead placed to one side to cool, and a second piece cast. This gives two corresponding pieces of lead.

Another piece of wood is provided, which contains a



COHESION—RUBBING BLOCKS TOGETHER.